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CANADIAN GEOGRAPHICAL JOURNAL

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LITTLE DIOMEDE
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THE COAST OF ANTRIM
By W. H. Curtis-Kelt

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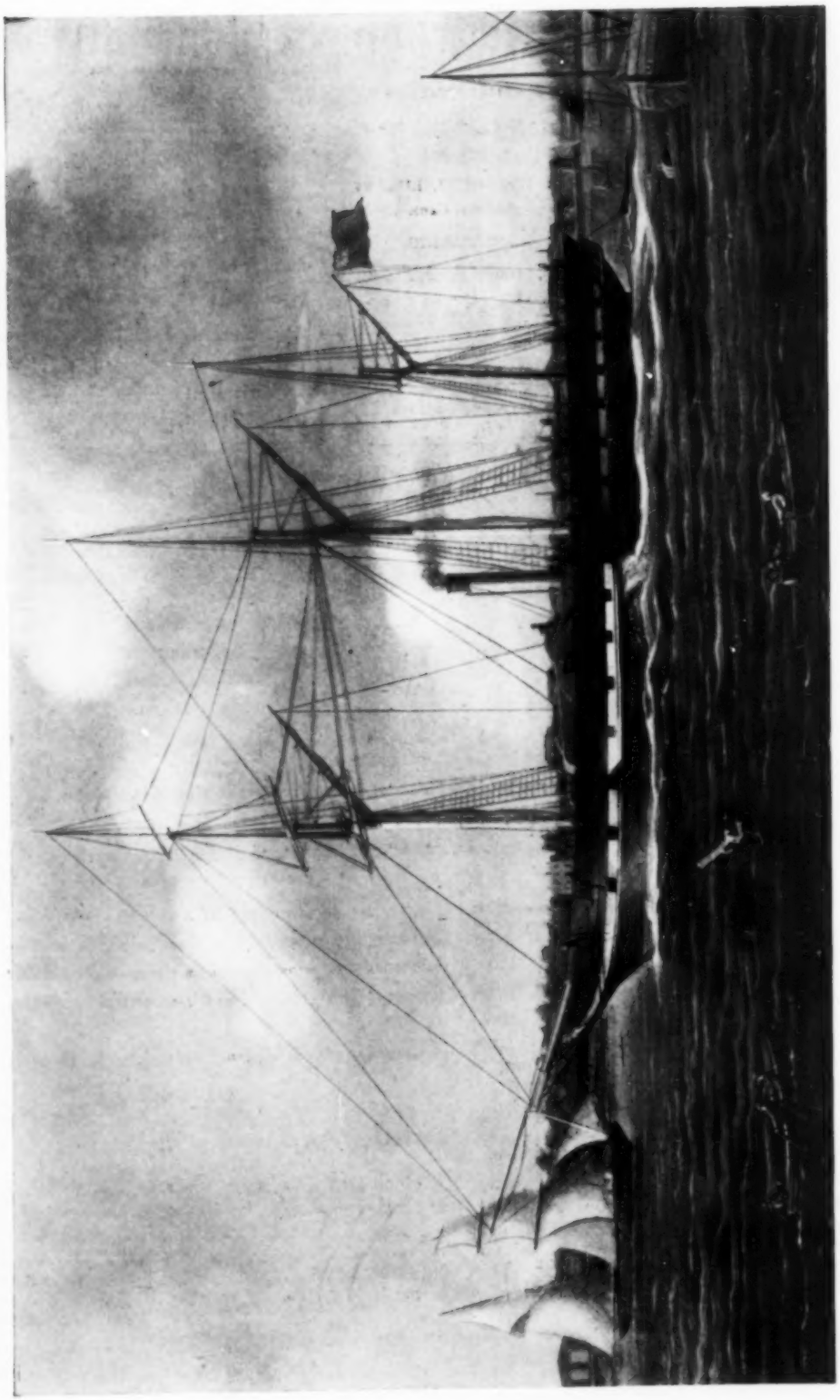


The "Royal William" in the Thames. From an oil painting by S. Skillett in 1834, now in the Library of the Literary and Historical Society of Quebec.

The Record-Making ROYAL WILLIAM 1833

By William Wood

SEVEN primary records have combined to make the Quebec-built *Royal William* quite unique among all the steamships of the Seven Seas. Of these seven primary records two made her unchallengeably first in Canada; three made her equally first in foreign waters; while two more made her first throughout the whole wide world.

The object of the present article is not only to mark the centenary of her first world-record-making voyage but also to base her sevenfold claim so safely on the original evidence that all the winds and waves of controversial strife can never shift her cargo of substantiated truth. But while inevitably correcting the innumerable sins, both of commission and omission, in practically all previous accounts, no matter by whom they have been written or by what authorities they have been approved, this article will take equal care to make no amendments whatsoever without giving precisely documented references, either in the text or the little final footnote, to the exact original evidence concerned. Readers can therefore judge for themselves whether we have brought the *Royal William's* records safe to port, after steering them between the Scylla of those "outsiders" who have hitherto ignored or misinterpreted the substantiated evidence and the Charybdis of those perhaps too pro-Canadian "insiders" who, quite as "queeringly", have hitherto exaggerated all the *pros*, without, alas, a due examination of the *cons*.

But, before we clear her decks for action, we had better examine her more celebrated rivals, lest doubting critics should keep asking:—"How about the *Savannah*, the *Enterprise*, and *Curaçao;* the *Sirius*, *Great Western*, and the rest?"

Canadians may think it a work of supererogation to disprove these counter-claims again. But we must remember that Canadian publicity was a very small affair, indeed, a hundred years ago, more especially in comparison with the vastly greater publicity emanating from the United Kingdom and United States, which, between them, then possessed far more ocean-going tonnage than all the other countries in the world. Besides, we must likewise remember that neither of the *Royal William's* primary world records was made under modern championship conditions: quite the reverse, in fact, as we shall presently see.

The regular mail-contract trans-atlantic steamer age began in 1840 with the four identical Clyde-built "paddlers" that inaugurated the famous line named after those sterling United-Empire-Loyalist Canadians, the Cunards. These four first Cunarders had been preceded, in 1838, by the Bristol-built *Great Western* and the Leith-built *Sirius*, both of "whom" likewise steamed the whole way across. Neither of these two has any predecessors of her own, hailing from the United Kingdom. But our *Royal William* "kept her kettle on the boil" the whole way over, from Nova Scotia to the Thames, in 1833. The Canadian record for unbroken steaming is therefore five years ahead of the United Kingdom's.

But how about the United States, where the Curator of Transportation and Engineering in the U.S. National Museum at Washington began his report for 1890 with these quite truthful words:—"The first voyages of a steamship across the Atlantic were made in 1819, by the *Savannah*, an American vessel, carrying the American flag, and manned by an American crew." And

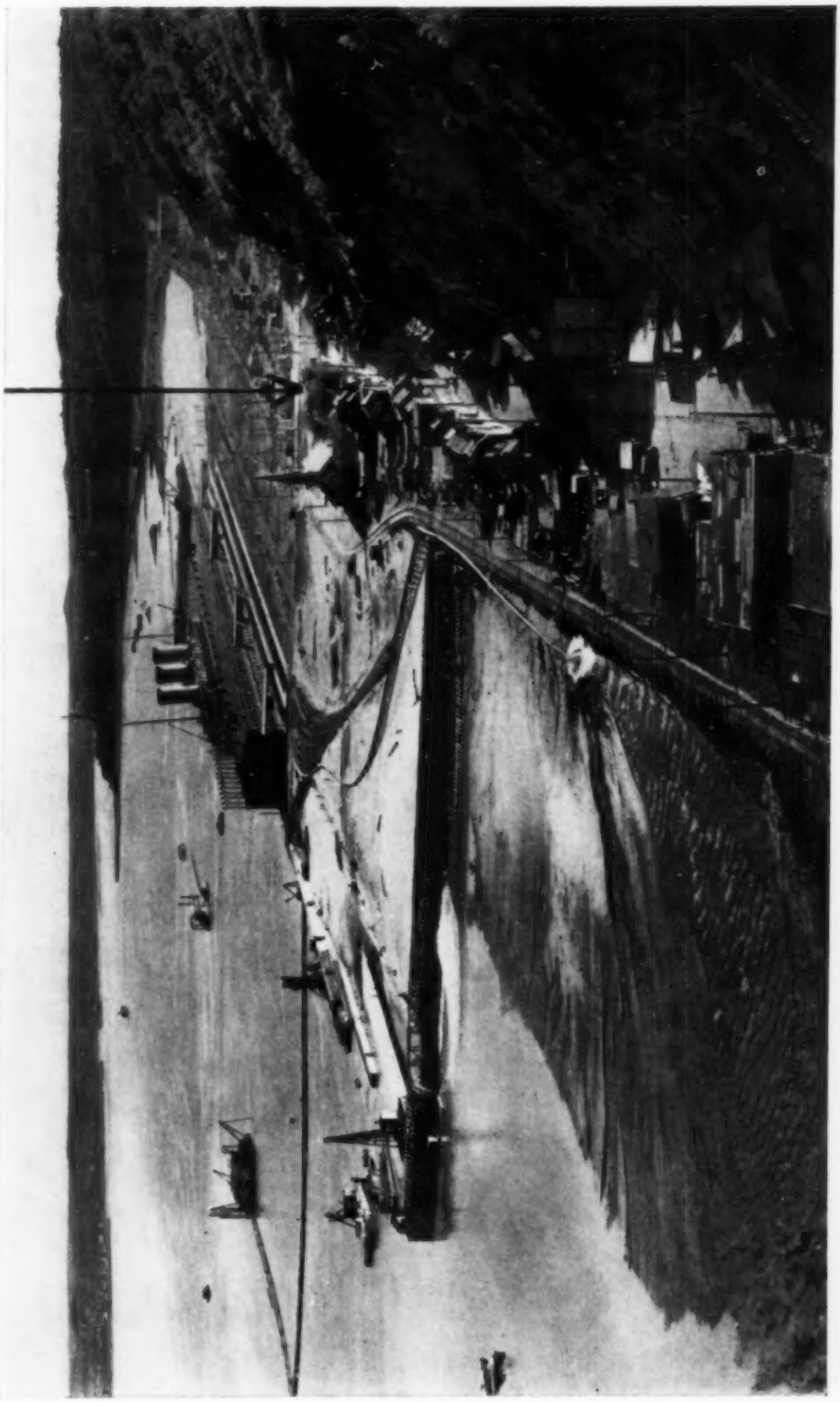
the *Savannah* certainly was the first vessel that ever used steam during a transatlantic voyage. Moreover, she enjoyed an immense publicity, besides much enthusiastic recognition in the most "exalted" quarters. Just before her epoch-making voyage President Monroe, of Monroe Doctrine fame, dined on board, found her "handsomely furnished with imported carpets, curtains, and hangings, and decorated with mirrors"; and this to such an extent that "the interior effect" was more like what one would see on board "a pleasure yacht than a steam packet." Altogether, he was so delighted with her prospective capabilities that he told her skipper to bring her round to Washington, after her return, when he thought the Government would buy her for use as a steam man-of-war along the coast of Cuba. Then, with all Savannah out to cheer her off, she sailed for Liverpool, exciting all sorts of varied interest by the way. The kind old British Admiral at Cork pursued her vainly with his fastest vessels, humanely hoping to rescue her imperilled crew, before her smoky fire had burnt her to the water's edge. At Liverpool she was, of course, the Transatlantic heroine for the crowd; but also the object of some suspicion, lest she might also be a very subtle new-fangled means of getting Napoleon out of Ste. Helena. From Liverpool she went to Copenhagen, and thence to Stockholm, where she was inspected by the royal family, and where Field Marshal Lord Lynedoch took passage in her for St. Petersburg. Lynedoch was so delighted to see her change from steam to sail in only fifteen minutes that he gave a solid silver coffee urn, inscribed "to Captain Moses Rogers, of the Steamship Savannah, being the first steam vessel that had crossed the Atlantic." The King of Sweden had already given Rogers "a stone and muller" and two chairs. And when the Tzar of All the Russias came aboard at Cronstadt he was so impressed that he gave Rogers a magnificent gold watch "three times as big as common watches and an excellent timekeeper."

This world-renowned *Savannah* made her return trip in twenty-five days. Next year her engines were sold; and, after two years more as a coastwise sailing packet, she was hopelessly wrecked on Long Island.

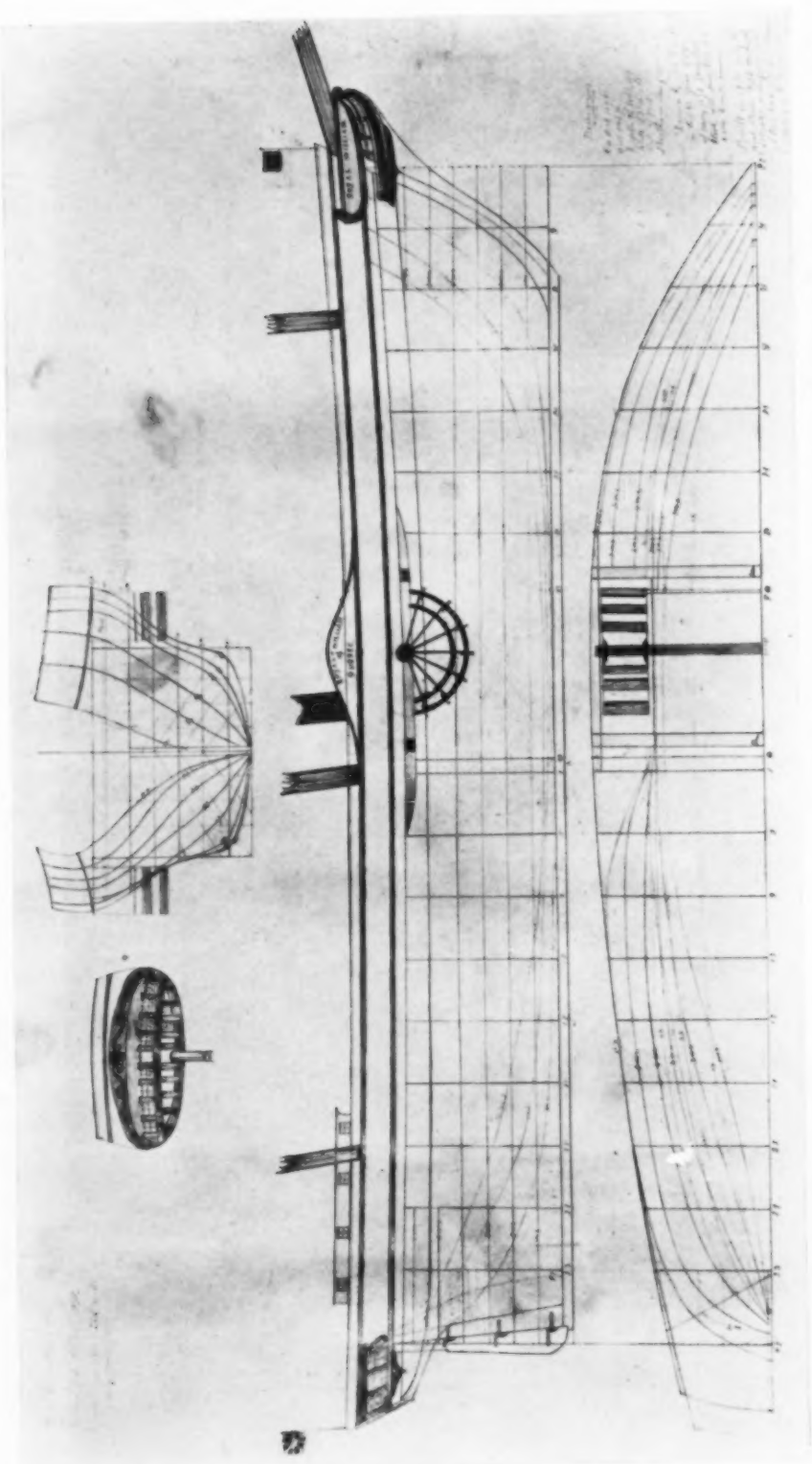
There is no doubt whatever that she was the first vessel in the world to use any steam at all while crossing any ocean. But she was not the first to steam the whole way. That world-record is the *Royal William's* The *Savannah's* log conclusively disproves her having made either of her two transatlantic voyages entirely under steam. She could not, indeed, have possibly so made them; because she carried far too little fuel, both wood and coal included. On the way over her log records that when Cork bore "W.b.S. 5 leagues" there was "no cole to get up steam." Eighty hours under steam was her limit during a voyage of twenty-nine days and eleven hours. As the return voyage took twenty-five days, and she could not possibly steam five, the record was unchanged. She really was an A1 sailing ship, fitted with such queer paddle wheels as the world had never seen till then, and never has seen since; for each wheel consisted of eight radial arms, held in position by a single flange, and so constructed that they could be folded up together, like a fan, and hoisted clear on deck.

No other transatlantic vessel ever steamed again, before the *Royal William*, except the Clyde-built *Curaçao*, which sailed from Antwerp for the Dutch West Indies in 1828. But as no one has ever claimed that she ever crossed, either then or afterwards, steaming the whole way, we may now turn to the only other possible rival of the *Royal William* on any of the Seven Seas: the *Enterprise*, which was under steam for no less than sixty-four days, during her voyage of a hundred and three, from London to Calcutta in 1825. She afterwards plied between Bombay and Suez. But even in this respect she has never been made a claimant for having "kept her kettle on the boil" the whole trip through.

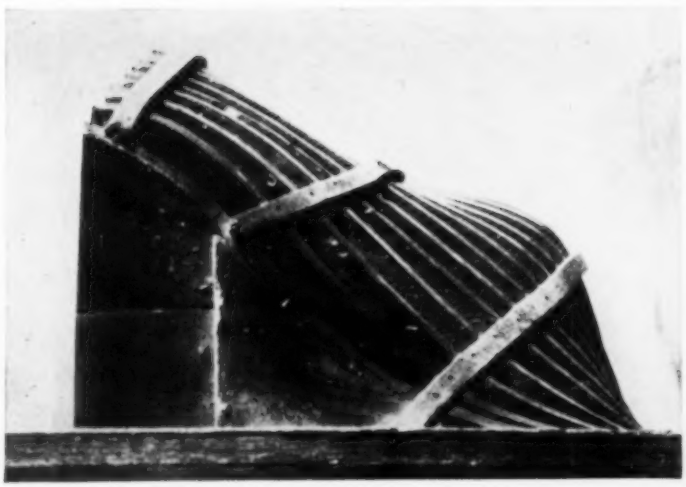
Let us now turn back to the *Royal William*. But, before we track down her seven records, we ought to note



The "Royal William" was launched on the 29th of April, 1831, from Campbell and Black's Cape Cove Shipyard, where the arrow points, on the modern road to the C.P.R. wharf, where the "Empress of Britain" is shown alongside in 1931.



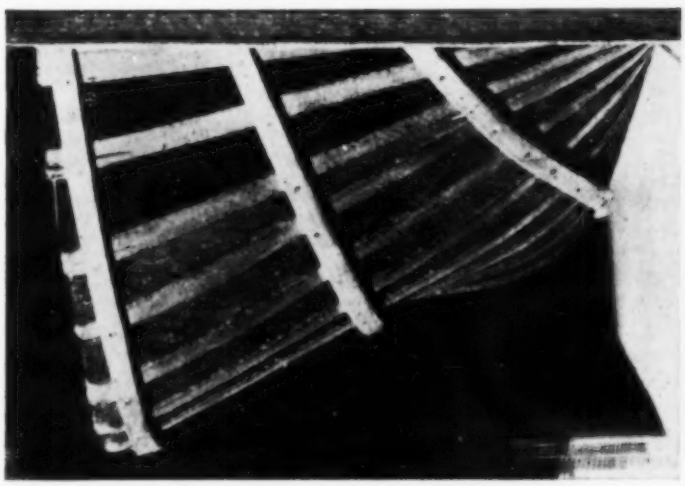
The Marine Architect's drawings of the "Royal William". Inscriptions—(Upper left)—"James Goudie, Senior, Marine Architect, 1891, North Evanston, Cook Co., Ill." (Lower right)—"Dimensions. On deck 159 ft. keel 146 ft. Depth of Hold 19 ft. Rake of Stern 13 ft., of Post 2 ft. Burthen in Tons gross 1645. Drawn by Jas. Goudie in his 82 years of age, 21st of May, 1891, every line and stroke of the pen by his own hand. Built in 1831, being the first Steam Ship to cross the Atlantic in August, 1833. A true copy of the Original deposited in the Historical Society Chicago Illinois by J.G."

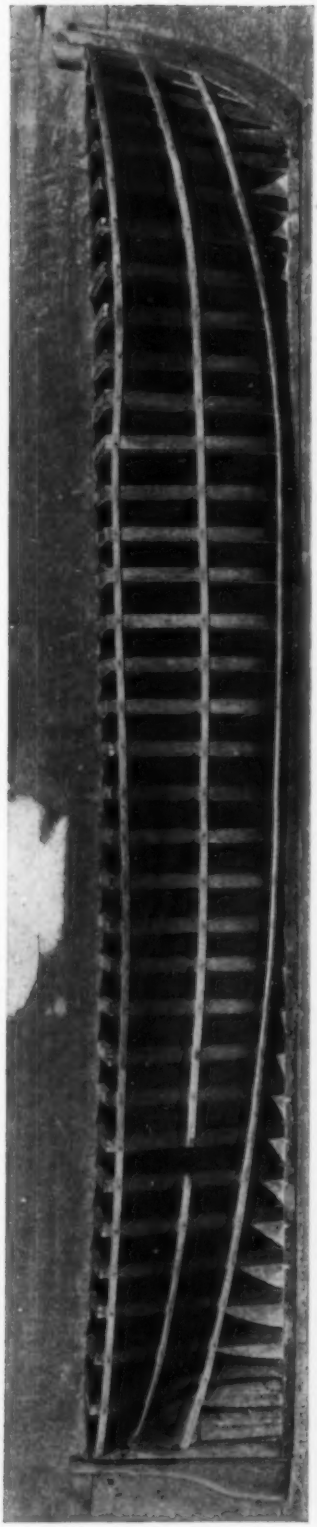


Below:—Original Builder's Model of the "Royal William", made by her marine draughtsman, James Goudie, 1830.

At Left:—End-on view of bow of model.

At Right:—End-on view of stern of model.





some of the most notorious mistakes that even the most well-meaning pro and con recorders have made about her for a hundred years.

Here are three gross errors within one sentence in W. S. Lindsay's well-known *History of Merchant Shipping*. "The *Royal William* was between 400 and 500 tons, built at Three Rivers, and her engines constructed in England." (Her gross tonnage was three times greater; she was built at Quebec; and the only non-Canadian parts of her entire machinery were the cranks and shaft from Napier's at Glasgow). There are plenty of sins of omission to match this one of commission. Most standard works of reference either ignore the *Royal William* or make gross mistakes about her. Not one has ever mentioned all her seven records.

On the other hand, her Canadian champions have nearly always claimed too much. For instance, the inscription under her original builder's model in the Library of the Literary and Historical Society of Quebec begins by stating that she was "The first vessel to cross the Atlantic under steam alone"; and, after thus queering her first world-record, ends without a word about her second! (*The Quebec Gazette*, when reporting the arrival of "The Bark *Rokeby*", on the 24th of September, 1833, mentioned that her log contained an entry, on the previous 27th of August, that she had passed the *Royal William*, in latitude 47°55″, longitude 45°30″, 9 days out from Pictou, and that the *Royal William* was then under canvas, wind W.S.W., as well as under steam.)

Now let us turn to the substantiated truth about the *Royal William* and her seven records: two Canadian, three foreign, two world-wide.

In 1825 the Parliament of Lower Canada passed "An Act for the Encouragement of the Trade and Intercourse between the ports of Quebec and Halifax." But fifteen hundred "Halifax" pounds failed to induce any applicants to build "a steam vessel of not less than 500 tons burthen." In 1830 a new Act offered three thousand pounds ($12,000); whereupon "John Saxton Campbell, Merchant, and George Black, Shipbuilder, Co-partners, with James Goudie, Marine draughtsman and foreman of the yard," laid the keel of the *Royal William*, at Cape Cove, on the most historic north shore of the St. Lawrence, between Champlain's Cape Diamond and Wolfe's Cove. After expert and intensive work, "from Thursday the 2nd of September, 1830, to Wednesday the 27th. of April, 1831," the *Royal William* was launched as the first sea-going steamer ever built in Canada. She was, decidedly, steamer first and sailer next. In this she was the precursor of practically all transatlantic steamers till nearly the end of the nineteenth century. For even men-of-war and liners of the very latest fashion were always built with some auxiliary sail-power until at least the eighteen-eighties. This, by the way, might account for some of the wording about the *Royal William's* transatlantic voyage; since the governing idea was to emphasise the fact that she was under steam the whole way over. But the words on the "memorial brass" in the Dominion Parliament are rather ambiguous ("First Vessel to Cross the Atlantic by Steam Power"); while those inscribed by the Numismatic and Antiquarian Society of Montreal on the site of the Bennet and Henderson foundry, where she was engined in 1831, are rather more than ambiguous; though quite as innocently meant:— ("The first vessel to cross the Atlantic or any Ocean entirely propelled by steam)"

On Friday afternoon, the 29th of April, 1831. all Quebec, and all the long-shore population, far and near, turned out en masse to see the *Royal William* launched; named by the Governor-General's consort, Lady Aylmer, after His Majesty the sailor king; and intended to be the supreme link in the great first chain of Canadian steamers connecting the eastern coast of Nova Scotia with the then wild western end of Lake Superior. In glorious weather; to the thrilling strains of martial music, and the re-echoing thunders of a royal salute, fired from the greatest guns of by far the greatest fortress the whole New World had ever seen; into a harbour world-renowned in peace and war; full of very diverse shipping, but all decked out with

Departure List, Port of Pictou, October 10, 1833. It will be noted that the "Royal William" is listed for August 17th, and that she took on 254 chaldrons of coals, (approximately 300 tons). Pictou coals stood in high esteem among Atlantic skippers.

innumerable rainbows of gaily welcoming flags; the *Royal William* took her stately way, amid a perfect hurricane of cheers from thirty thousand patriot throats.

Next morning the *British America* took her in tow for Montreal; but, being unable to stem St. Mary's Current, brought her alongside just below, where Bennet and Henderson fitted in her engines. John Bennet was a very experienced Scotch engineer, who, after serving apprenticeship with Boulton and Watt, came out to Montreal in 1812, under contract with John Molson, the great local brewer, at what was then the fairly good salary of four hundred dollars a year. But Bennet served Molson "diligently and faithfully" for other things besides the brewing machines, as he fitted engines into the *Swiftsure*, which did good service as an army transport, in 1813-14, during the war then raging with the United States.

(It may interest my readers to know that when I was broadcasting the centenary of the launch of the *Royal William*, from Quebec, on the 29th of April, 1931, Bennet's grandson, Mr. R. B. Bennet, who is, himself, another kind of "automotive" expert, happend to be listening-in at Toronto, whence he sent me some illuminating details on his grandsire's work, all from the original documents now in his possession. A few other human touches are worth mention here. The senior contractor, Campbell, was a half-pay officer of the 99th Foot, just off to the South American wars in 1819, the year of the *Savannah*, when his brother induced him to try lumbering instead, on the present site of Ottawa, which he refused to buy for sixty pounds, cash down. The junior contractor, Black, lived well beyond the *Royal William's* golden jubilee, and wrote about her engines in 1884; while her draughtsman, Goudie, a founder, J. W. Henry, and two of her original passengers, the brothers Wicksteed, lived to celebrate her diamond jubilee in 1891).

Steaming down from Montreal she made three most successful trips between Quebec and Halifax in 1831, thus establishing her second Canadian primary record, as the first steamer that ever "promoted Intercolonial trade."

1832 was the direst cholera season ever known. The immigration vessels were mere morgues. Quebec's busy waterfront was numb with terror of the deathward plague. And business was face to face with bankruptcy all round.

Next year the *Royal William* made three records: two foreign and one world-. She entered Boston on the 17th of June; and, being the first seagoing steamer that had ever flown the Union Jack in any U. S. port, she made a great sensation. Moreover, when she saluted the Stars and Stripes, while steaming past Fort Independence, the U. S. Army band there played *God Save the King*.

Then came her first world-record. No bands, no salutes, no high-placed Personages graced this sad occasion; for, after having been already sold at sheriff's sale, she was now being sent to London in the hope that some of her lost value might be recouped. Bunkering nearly 300 tons of coal at Pictou, she made Gravesend in 25 days. Her log was lost. But her captain, John McDougall, wrote a letter, still extant, to William King, Quebec, nine weeks after her arrival; and, using all the original documents then at his disposal, wrote a much more detailed account to Christie, the historian, just twenty years later, in 1853. Moreover, there is the evidence of others aboard, of the vessels which passed her at sea, besides the final fact that no vessel, no passenger, nor any other person, has ever recorded her with steam off at any time at all. She certainly used sails. But the crucial point is that she kept her steam up all the way. This required some resolution. For a tremendous storm off Newfoundland strained her heavily loaded hull. She began to leak. Her starboard engine stuck. And the engineer came up to say that she was sinking. But McDougall carried on, with either port or starboard engine, or with both, until she reached Gravesend.

Quickly sold in London, she was immediately chartered by the Portuguese, who used her as a transport, the first steam transport they had ever used.

Courtesy of the Public Archives of Canada

Quebec from the Lévis Shore. From a sketch by R. A. Sproule, 1832.

Pictou and its harbour, about the time of the sailing of the "Royal William". From the painting by William Kitchen, now in the possession of Dr. George H. Cox, of New Glasgow, N.S.

Courtesy of the Public Archives of Canada

Quebec one hundred years ago. From an aquatint of a drawing by Lieut. Col. James P. Cockburn, 1833.

Courtesy of the Public Archives of Canada

The Port of Pictou, Nova Scotia, in 1839. From a drawing by William Eagar.

Next year, in 1834, the Spaniards bought her, re-named her *Isabella Segunda*, armed her, and used her as a man-of-war, the first steam man-of-war the Spaniards ever had.

Finally, on the 5th of May, 1836, in the Bay of San Sebastian, when supporting the sea flank of the British Legion, under Sir De Lacy Evans, against the Carlists, she became the first vessel in the world that ever fired a shot in action under steam.

Her seven primary records (Canadian, foreign, world-) are therefore these:— The first seagoing steamer ever built in Canada, the first steamer that ever plied on "Intercolonial" affairs; the first steamer that ever entered a U. S. harbour under the Union Jack, the first steam transport in Portugal, the first steam man-of-war in Spain; the first vessel in the world that ever fired a shot in action under steam, and the first that ever crossed any ocean steaming the whole way.

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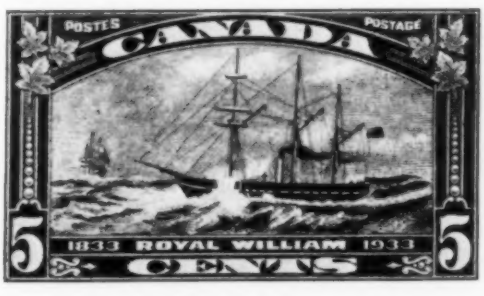
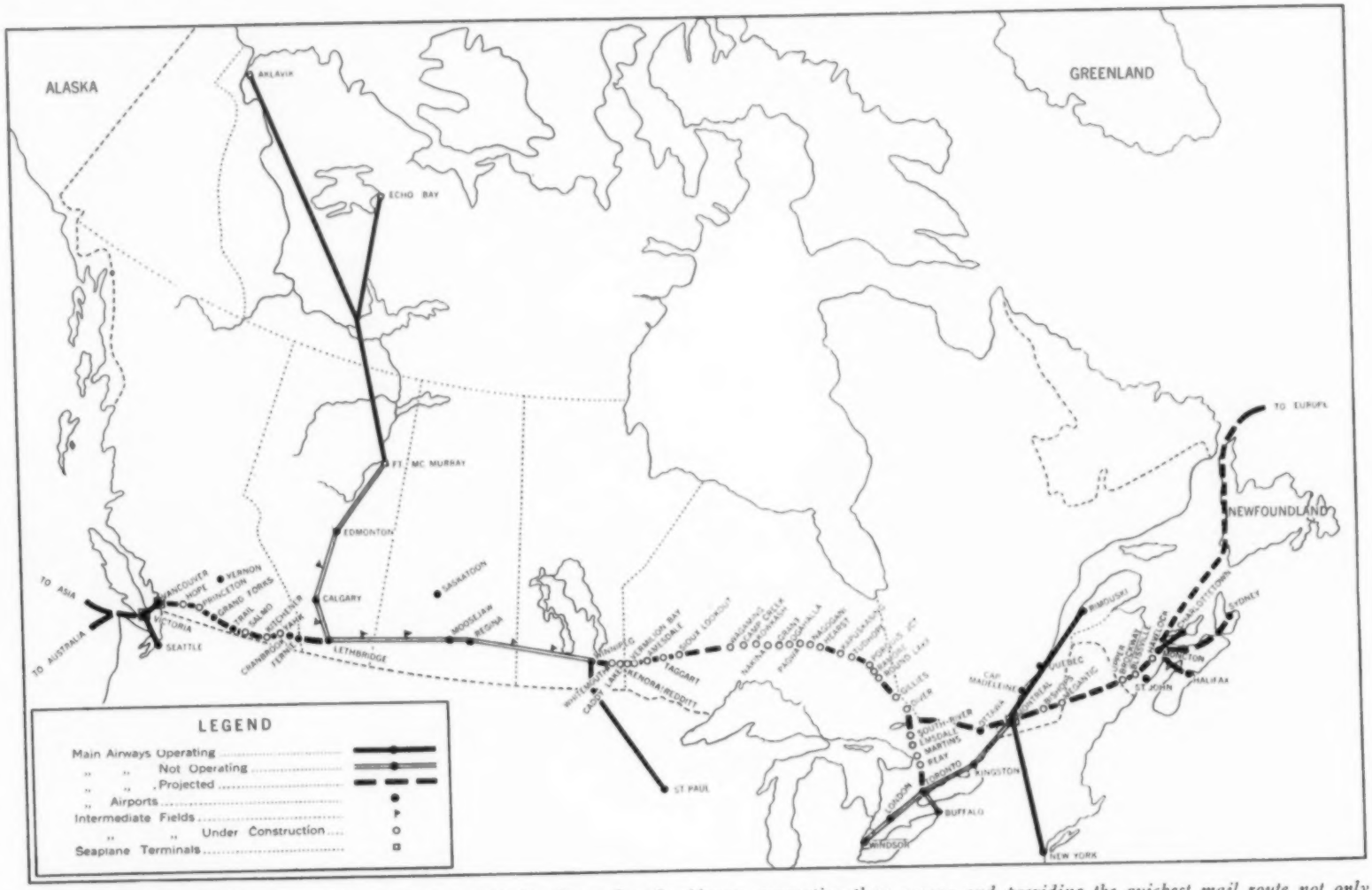
4. Fry's *History of North Atlantic Steam Navigation*. London: Low, 1896.
5. *Report of the Secretary of State of Canada* for 1894: Appendix G. An excellent summary of the *Royal William's* history, except for a few omissions, and the usual error about her being "the first vessel to cross the ocean wholly by means of steam" (page 82, in Parliament's letter to Governor-General, asking him to unveil the brass tablet). For her firing the world's first shot in action under steam, see pages 73-74.

P.S. As author of this corrective article I must not end without confessing that I made the same mistake (on page 145 of *All Afloat:* Vol. 31 of "Chronicles of Canada", 1914). What steamer first crossed any ocean without using any sails is quite another story.



On August 5th 1833 — one hundred years ago — the *Royal William*, built in Quebec, sailed from Pictou, N.S., for London. She was the first vessel to cross the Atlantic entirely under steam. Nor is this, as Colonel Wood has shown in the above article, her only memorable achievement. The anniversary of the voyage is being marked by the Dominion Government by issuing a special postage stamp, which will appear this month, and which, through the courtesy of the Post Office Department, is reproduced herewith.—Editor.



Unemployment Relief Workers are being used to complete the Trans-Canada Airway, connecting three oceans and providing the quickest mail route not only across Canada, but between Europe and Asia.

Royal Canadian Air Force Photograph

The Canadian Air Mail

The Trans-Canada Airway

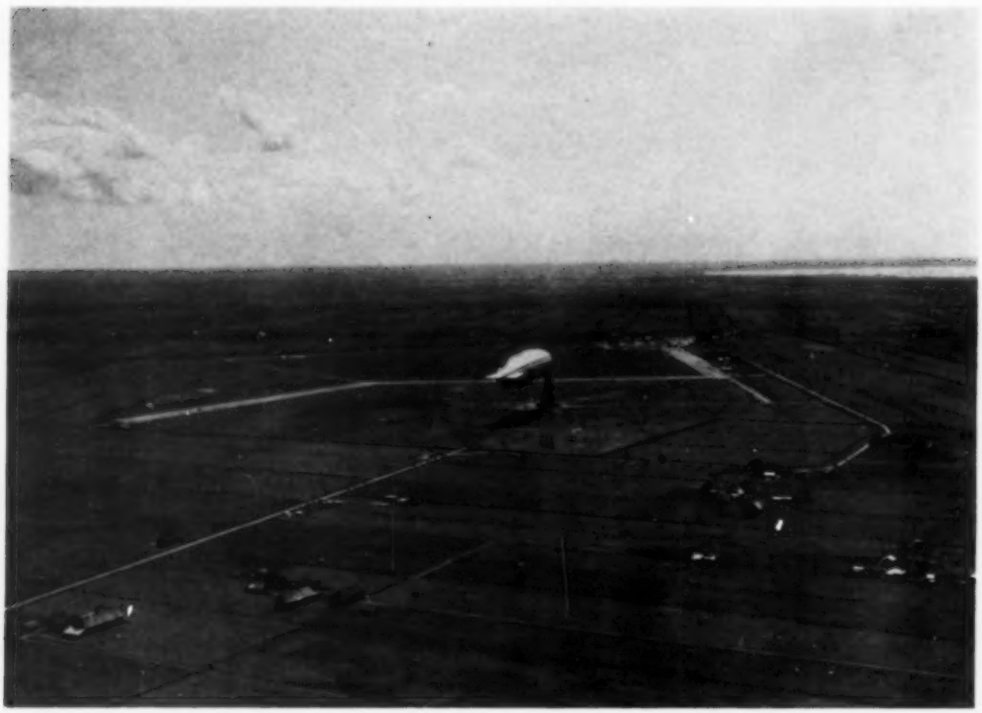
By LAWRENCE J. BURPEE

IF it is sound economic practice — as it surely must be, particularly in these hard times — to kill one bird with one stone, what can one call the bagging of two birds with one stone but a most notable achievement! That, at any rate, is being done in the project of the Dominion Government of completing a system of air stations across Canada from ocean to ocean, with the labour of unemployed Canadians.

This is a big undertaking, involving under normal conditions a very large expenditure of money, and would have had to wait for some years if a way had not been found of linking it up with the unemployed relief programme. Nevertheless it is a matter of very considerable importance, not only to Canada but to the British Commonwealth.

The purpose of the Trans-Canada Airway is to provide an air route across the Dominion from the Atlantic to the Pacific for the rapid transport of mail, express and, eventually, passenger traffic. It will be linked with all the larger centres of population and will bring the scattered provinces of the Dominion into closer touch. Time in transit, not distance, is the standard of measurement to-day. By the Trans-Canada Airway time in transit will be cut to one-fourth of the present standards. Vancouver will be one day distant from Montreal, instead of, as at present, 4½ days, and Winnipeg and the Maritime Provinces an over-night flight from Montreal and Toronto.

The Trans-Canada Airway is not merely a domestic matter and too much emphasis cannot be put on the fact that the Dominion Government is not looking at the project from any narrow or selfish point of view. They see in it a substantial contribution to world communications. When the Trans-Canada Airway is completed it will make connection with the present ocean steamer services on our Atlantic and Pacific coasts and, when the time comes, it will meet the trans-Atlantic and trans-Pacific air services of the future, joining the continent of North America with both Europe and Asia. The shortest route is via Canada. Using existing steamships and making connection at Belle Isle, Halifax, or other transfer point on our Atlantic coast, depending on the season of the year,



Royal Canadian Air Force Photograph

St. Hubert, air-port of Montreal, photographed at the time of the visit to Canada of the British airship R-100.

mails from London may de delivered on the Pacific coast in five days and in Tokio in seventeen days. By the eastern portion of the Trans-Canada Airway and its extension to Newfoundland and the United States, European mails to all parts of the North American continent would be carried by the fastest and most direct routes. The construction of the Trans-Canada Airway is not only of national but of imperial and, indeed, world importance.

The work involves the construction of a large number of intermediate aerodromes at suitable locations between existing city airports, so spaced that an aeroplane flying along the route will always be in reasonable reach of a safe landing field. In 1928 and 1929 the sections of the airway in the Prairie Provinces were constructed and completely equipped and surveys have been in hand for some years on the choice of suitable locations in the other sections. Work is now in progress on the aerodromes required from Lethbridge west to Vancouver; between Winnipeg, Toronto and Montreal; and from Montreal to the Maritime Provinces.

The inevitable criticism will be offered that this is merely another competitor for the railways and another stumbling-block in their economic recovery. One doubts, however, if it would be either practicable or wise to attempt to rehabilitate railways by removing all competitive means of transportation. The sound policy for the future would appear to be to so control and harmonize transportation by railway, highway, water and air that the most efficient use might be made of each, in the interests of both the public and the stockholders.

Now as to the relationship between the Trans-Canada Airway and the unemployment problem. It will be remembered that in this country in the last two or three years we have experimented with several large schemes of relief. Without attempting to go into the matter in any detail, it may be sufficient to say that these schemes have been partly direct and partly indirect relief, in varying proportions.

Royal Canadian Air Force Photograph

A western airway terminal. Jericho Beach Station, Vancouver, B.C.

With the example of the British dole as a warning, Canadian policy was at first unalterably opposed to anything of the kind, and determined to safeguard Canadian manhood and self-respect by using the unemployed on public works throughout the country. In practice this to a large extent took the form of road-building, though a great many other projects, large and small, were carried out. The work was done through a scheme of cooperation, in which the Dominion, the Provinces and the Municipalities were partners, each sharing the cost and the control. Experience proved conclusively that, while this plan gave employment to a large number of men, it was very extravagant; so much so that when representatives of the Provinces came together to consider the matter they were unanimous that, whatever the objections to direct relief, there was practically no alternative.

Inevitably, also, there has been a good deal of criticism of the shifting policy of those responsible for the relief of the unemployed, and that criticism perhaps did not give as much weight as it should have to the magnitude of the emergency and the lack of information as to the most effective remedies. There were no real precedents either for the particular problem or how to deal with it. Canada had never before had so many of her people in distress, and at the same time had so little money with which to relieve that distress. She was very much in the position of the man, heavily in debt, who is trying to help others dependent upon him. With the best intentions he is bound to make mistakes. But it is perhaps better to make mistakes and relieve suffering, than wait to work out an admirable plan while people starve.

Be that as it may, the Government tried public works in cooperation with the Provinces and Municipalities; then it tried direct relief; and to-day it is once more trying public works, but on an entirely different plan. However desirable

it was, from more than one point of view, that the Dominion, the Provinces and the Municipalities should cooperate in the relief of unemployment, it was almost inevitable that such a cumbrous plan, with its very divided control, should prove wasteful and extravagant. That it did, is established by the fact that under the Relief Act of 1930 some 7,500,000 days of work were paid for, and that the cost to the governments was approximately $69,000,000, which works out at $9.22 per man per day — a very heavy figure for what was mainly unskilled labour. In direct contrast, the cost of the present plan of work in connection with the Trans-Canada Airway and allied projects amounts to $1.01 per man per day. Again, as the compelling reason for switching from public works to direct relief was the impossible cost of the former, it is interesting to note that the real cost of the present plan of public works is less that one-third the cost of direct relief. Allowing 89 cents as the average capital value of the improvement under the Airway plan, the net cost works out at about 12 cents, as compared with 40 cents which has been the standard rate of contribution to direct relief in the cities.

The explanation of the very low cost of the present relief scheme is partly that it is under unified and efficient control, and partly that the Dominion Government is making very full use of its own resources in technical men and equipment in the Department of National Defence. It is designed primarily to take care of single homeless men without employment and in need of relief, a class for which no provision other than scanty food in extemporized hostels had been made in other schemes of relief. Starting with a few hundred men last winter, there are now about 10,000 employed in the various projects, which include, in addition to the emergency landing fields that will form part of the Trans-Canada Airway, repairs to the ancient walls of Quebec and to the Citadel at Halifax, no longer of strategic importance but of great and continuing historic interest; improvements at existing air stations and airports such as St John, Ottawa, Camp Borden and Winnipeg, Valcartier, Petawawa and Dundurn Training Camps Long Branch, near Toronto, and at Barriefield Barracks, Cranbrook Rifle Range, etc. One of the most ambitious and important of these projects provides for reforestation on various areas throughout the country coming under

The workers enjoy their meals in clean and well ordered surroundings, and boots and clothing are kept in repair by tradesmen from among their numbers. The dining room shown here is at Ottawa Air Station.

Hauling a load of bridge timber at Gillies Ontario; and, below, cutting firewood to feed the stoves at the Kitchener, B.C., Camp.

the control of the Department of National Defence. Already nearly 1,500,000 young trees have been set out. These were provided through the generosity and cooperation of the Provinces of Quebec and Ontario.

It is expected that by the time work is in progress on all these branches of a comprehensive scheme of public improvements, between 40,000 and 50,000 men will have been taken off the streets and put to useful employment. Not the least important feature of the plan is that it provides men with relief under conditions that preserve their self-respect. They are not on the dole; they are doing useful work; and they can look forward to reestablishing themselves in their own occupations as soon as conditions improve. Indeed one of the governing principles of the project is the return of the men engaged to the ordinary economic life of the country just as soon as conditions permit. All plans are subject to that principle. The works in progress, or to be undertaken, while all in the public interest, are of such a nature that any or all of them may be postponed. They constitute in fact a "reservoir of employment" usefully absorbing idle labour in slack times and returning the workers to industry as required, their efficiency and morale unimpaired by idleness.

It was perhaps inevitable that a scheme administered by the Department of National Defence should be condemned in some quarters as a veiled attempt to train men for war, or at best a plan of relief in which the workers would be held under strict military discipline. As anyone can see who takes the trouble to visit one of the camps, there is absolutely nothing to justify either of these suggestions. The men join voluntarily, and most if not all of them are glad of the chance; they are free to leave whenever they choose; they are required to do a reasonable day's work, but no more; they are not in any sense under military control or discipline; in fact the organization is much the same as would be found in any well-conducted construction or lumber camp. So far indeed from this being an attempt of the military authorities to conscript men for war, it would seem to be a striking example of the possibilities of national usefulness of a military organization in the interest of peace, a practical illustration of the possibility of turning swords into ploughshares.

Taking a typical Airway job, one of the emergency landing stations, the men are provided with suitable clothing, bedding and other necessaries, trans-

Royal Canadian Air Force Photograph

Mail planes connecting with ocean steamers at Atlantic and Pacific, will make the Trans-Canada Airway a vital link in the scheme of Inter-Imperial mail will make transport.

Royal Canadian Air Force Photograph

Ottawa Air Station at Rockliffe, Ont.

Royal Canadian Air Force Photograph

The broad level expanse of the aerodrome at High River, Alberta.

Royal Canadian Air Force Photograph

Sub-station for sea planes at Lac du Bonnet, Manitoba.

Cookhouse fatigue. The ancient yoke is brought into use for carrying water at the camp at Megantic, Quebec.

ported to the scene of their labours, and put to work. Their first task is to put up their own sleeping and living quarters. After that, the ground must be cleared and levelled, and permanent buildings erected. These and other more incidental jobs will be sufficient to keep them employed for some time to come. They are not paid a wage for their work, the whole idea of the plan being that this is an emergency relief project designed to carry them over the period of unemployment. On the other hand, they are clothed, fed and sheltered, and get a daily allowance of 20 cents for tobacco or other small luxuries. They work eight hours a day, except Sundays, Saturday afternoons, and statutory holidays. They are well fed, and live in clean, comfortable quarters. Special efforts are made to provide them with equipment for outdoor games, and there is generally a recreation hut or tent with cards, checkers, reading matter, etc. The National Council of Women and the I.O.D.E. have recently undertaken to raise and organize a comforts fund for the camps.

Ditching operations at Catawampus Creek, Camp Borden, Ont.

Living conditions are made as comfortable as possible for the workers. The view shows the interior of a canvas-covered hut at the Ottawa Air Station.

Wherever possible the men are put at jobs with which they are familiar. In one of the camps I visited an unemployed carpenter was hard at work in the carpenter shop, a barber was cutting hair in a neighbouring room, and a tailor was mending clothing in another. No charge is made to the men for these or any other services, including those of the medical officer. The principle followed is that it is in the highest degree immoral to exploit, for public or private gain, the need of persons requiring relief. It should be noted that the technical men in charge of construction, field work, etc., are also drawn from the ranks of the unemployed, on recommendation of the Engineering Institute of Canada and the various provincial professional associations. With the assistance of the Frontier College, steps are being taken to provide the men with educational and instructional classes, of which they can take advantage in their spare time, it being the guiding principle of those who are directing this unemployment relief that the men

Stumps like this one are being cleared to make a landing field at Salmo, B.C.

are not merely to be taken care of physically and morally, their self-respect built up again where it had been undermined by pressure of circumstances, but also equipped to hold their own in the world when it is ready once more to afford them a living. Wherever practicable provision is being made for religious services on Sundays.

While a large proportion of the men who are finding employment at the camps are classed as unskilled labourers, an astonishing variety of occupations is found among those who apply. For instance, among 400 men engaged for work at Quebec, nineteen were found to be cooks, three were electricians, four accountants, fifteen carpenters, twelve painters, eight masons, six chauffeurs, eighteen salesman, two tailors, two stone-cutters, five leather workers, three barbers, nine mechanics, five shoemakers, two bakers, seven plumbers, two telegraph operators, three hospital orderlies, three butchers, and a musician, an architect, a joiner, a cigar maker, a locksmith, a boatman, a typographer, an engineer and a printer.

It seems appropriate to close this sketch of a very praiseworthy and successful attempt to find temporary employment for single, homeless Canadians, in work that is both worth while and in the public interest, by quoting the unstudied comment of one of these men, in a letter to a friend:

"This winter" he writes "many of us fellows who were unable to find jobs have been working at the Citadel (Halifax), and I for one take pride in the share I have had in building the road round the summit of that fine old hill. I would like to go on, till I can find some way of reestablishing myself, caring in part for some such public property that will make others enjoy themselves. We are not overpaid for the work we do, but I am not complaining. It is good to know that you are doing something worth while and lasting, rather than just drifting round riding freight cars and sleeping on park benches."

Activities at the Ottawa Air Station. The recruited workers are seen above, putting up a new storage building, and, at the right, constructing hut quarters.

The Battle Against Wheat Rust

By R. M. Scott

EIGHT years of intensive research have, it is believed, solved one of the most serious problems that have confronted the western Canadian farmer — Wheat Rust. The solution lies not in eliminating rust, but rather in developing a wheat that will resist it. Rust has cost Canada hundreds of millions of dollars. Its conquest is, therefore, an event of outstanding importance and incalculable value.

Wheats that are highly resistant to wheat-stem rust and that are perfectly satisfactory from the two-fold standpoint of agronomic behaviour in the field, and quality in the milling and baking test, have now been produced. The announcement of this outstanding fact, the importance of which will be increasingly appreciated throughout the country as people realize its significance, was made by the Associate Committee on Field Crop Diseases organized under the National Research Council of Canada at the close of the annual conference held at Winnipeg last April.

This group of scientists at that time issued the following characteristically formal declaration:

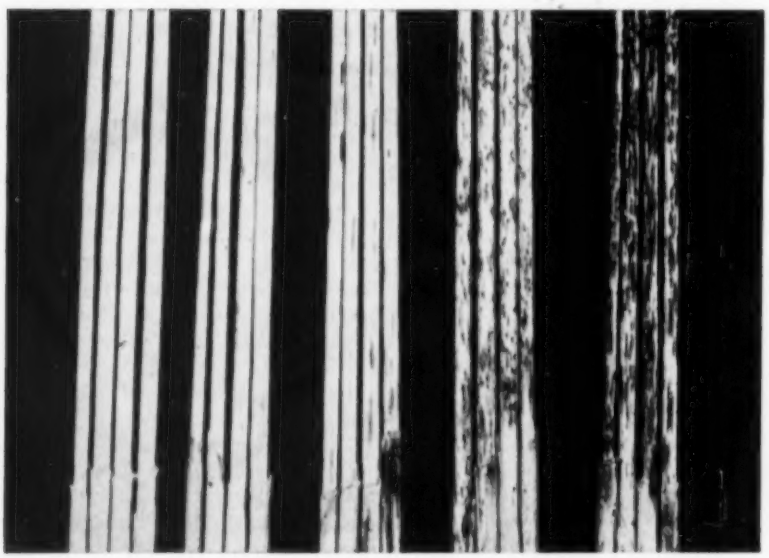
"The committee, after considering the progress reports of the plant breeders, the results of the co-operative tests and the report of the milling and baking chemists, feels safe in making the statement that the highly disease-resistant wheats have now been produced that are prefectly satisfactory from the standpoint of quality and agronomic behaviour.

"It seems that out of 33 strains in the co-operative tests in 1932 at least six are suitable for distribution to farmers, but only small quantities of seed are available at present, and it will take two seasons to increase the quantity to the required point. In the meantime, commercial milling tests will be made on the strains selected, and further field tests with a view to reducing their number to two or three adapted to the varying conditions to be found in the wheat growing area.

"Every effort will be made from now on to increase the seed of these wheats as rapidly as possible".

Laconic though the statement is, it tells the results of eight years of concentrated co-operative effort on the part of Canadian plant breeders, plant pathologists, and milling and baking chemists to provide Canadian farmers a guarantee of yields and more economical production where none existed before, insofar as wheat stem rust is concerned. Particularly gratifying too is the fact that this result has been brought

The enemy of the western farmer. Responsible for a loss of $280,000,000 in eight years! Black spores, or teliospores of Puccinia graminis, commonly known as wheat-stem rust. They are produced in late summer and fall on the wheat crops in Western Canada.



Stems of Marquis wheat grown in plots at Winnipeg showing the range of stem rust infection in sulphur dusted plots. On the left the dusted stems showing no rust; next group 5% rust; next group 20%; next group 50%; last group a check plot not dusted 85% infection.

—Dominion Department of Agriculture photograph.

about by the "all-Canadian route" — by Canadian scientists, in Canadian institutions, for Canadian people.

Placing a monetary value on these rust resistant wheats would be next to impossible. The territory affected by rust in Western Canada alone, involves some 288,000 prairie farms growing over 25,000,000 acres of wheat; reaches from Winnipeg westward over 800 miles along the International boundary; and extends northward from this line as far as wheat is grown. South of the boundary in the United States lies the great plains area with its millions of acres of wheat. Who would be so bold as to even venture a guess as to the saving to be effected? The dollars and cents value will never be known for comparisons will never be possible.

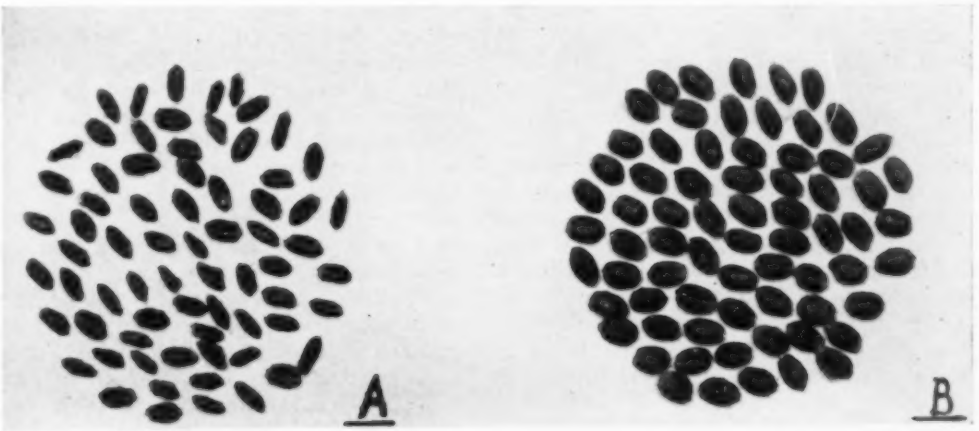
The loss already sustained is, however, quite a different matter. It is quite possible with present day scientific investigations to put a nearby figure on it. During the past eight years,

In the centre Marquis wheat, the standard bread wheat of Canada. On the left is a cross between H-44 and Reward and on the right a cross between H-44 and Marquis, two of the most promising rust resistant wheats derived from the breeding work done to secure rust resistant wheats. Note the similarity in appearance which is assuredly not an accidental feature.

Rod rows were employed in growing of the wheats for breeding and testing purposes in the early years of the work.

the same eight years that the breeding work was carried on, losses to wheat alone in Manitoba and Saskatchewan have been determined at $35,000,000 annually — a total of $280,000,000! The method employed to compute these losses has been carefully planned and is very accurate. Losses in bushels per acre were measured on rust-controlled sulphur-dusted plots at the Rust Laboratory at Winnipeg. Sulphur dust is an effective fungicide. Different rates and dates of application on different plots provide different degrees of infection by rust and hence different percentages of rust damage and graded yields. Each year the percentage of rust infection was determined over the wheat-growing areas in these provinces and the loss in bushels determined by comparison with the controlled plots. From here it is but a problem in mathematics to compute the total loss in bushels through the wheat acreage figures, yields, and price statistics for the year in question.

The loss is an astounding one. When contrasted with the comparatively



—Dominion Department of Agriculture photograph

Showing the effect of rust on the sample of wheat. "A" rusted wheat, practically worthless; "B" unrusted wheat, a full plump sample.

—Dominion Department of Agriculture photograph

Royal Canadian Air Force plane equipped with extended arm to expose a microscopic slide on which rust spores were trapped 5,000 feet in the air. Such work was done on epidemiology studies on rust in Manitoba.

insignificant sum of considerably less than one million dollars—in fact nearer to half a million dollars — spent in all the eight years of research work to produce these wheats, the cost to the taxpayers of Canada fades well into the background. The ratio of loss to cost is in fact 280 to 1!

Little perhaps need be said to emphasize the economic importance of stem rust of cereals in Western Canada. Persistently recurring rust losses have fixed public attention on the matter. Stem rust has long been accepted as the most serious problem in wheat production on the prairies. The worst epidemic on record occurred in 1916 and caused an estimated loss in Manitoba and Saskatchewan of 200 million dollars through injury to wheat alone. In 1923 another epidemic occurred which was not however nearly so disastrous as the one in 1916. Losses were estimated at 75 million dollars. In 1925 still another epidemic took place which was declared comparable to the one in 1916 in severity and scope and in the damage done. In 1927 losses were on a major scale also. Unfortunately rust losses have not been confined to these epidemic years; many sections, particularly in Manitoba and Saskatchewan have suffered to a greater or less extent every year.

Prior to 1916 comparatively slow progress was made in the development of research work on rust resistant wheats, but immediately following that serious epidemic events began to move faster. An exhaustive enquiry was conducted in connection with the 1916 epidemic and as a result two field laboratories were established, one at Indian Head and one at Brandon, by the Dominion Department of Agriculture. In August, 1917, to thoroughly organize this work the Department called a conference at Winnipeg. Laboratory and greenhouse accommodation was granted at Manitoba Agricultural College and headquarters established for the west at Saskatoon. Little more was done until 1924 when, following a detailed discussion of the rust problem in the select standing committee on agriculture of the House of Commons,

—Dominion Department of Agriculture photograph

Aeroplane distributing sulphur dust over a Manitoba wheat field. Sulphur dusting is effective in control of stem rust but is uneconomic.

it was agreed to establish a special Rust Research Laboratory for Canada, and a grant of $50,000 was requested to carry on the work.

Events now moved more rapidly. It was soon decided to locate the central laboratory at Winnipeg, the centre of the wheat market of Canada. In September of the same year, 1924, a second conference on wheat rust was called at Winnipeg, under the joint auspices of the Dominion Department of Agriculture and the National Research Council, where agreement was reached on the lines to be followed in the research work to be undertaken. The laboratory, completed in 1925, was located on the grounds of the Manitoba Agricultural College at Winnipeg, on a site granted to the Dominion Department of Agriculture, which supplied the entire funds for the building.

Technically the work of developing a rust resistant wheat was divided into two parts — pathological investigations and plant breeding. Up to this time Dr. W. P. Fraser, Saskatoon, a very able pathologist, had been in charge. He was succeeded in 1925 by Dr. D. L. Bailey, who was in turn succeeded by Dr. J. H. Craigie in 1928. The plant breeding work at Winnipeg was undertaken and carried through by Dr. C H. Goulden. With his arrival in 1925 active breeding work commenced.

Plant breeding stock for the work at Winnipeg was secured from different sources. Stakeman and Hayes, at the University of Minnesota, had developed at this time a wheat named Marquillo, a cross between Marquis, the standard Canadian bread wheat, and Iumillo, a soft non-bread wheat. This was the first rust resistant wheat distributed to any extent, but it was later d scarded on account of its poor quality. McFadden, of South Dakota State College, produced two wheats "H-44" and "Hope", sister varieties resulting from a cross of Marquis and Emmer. These last two have provided the foundation for most of the breeding work done at Winnipeg and at the University of Saskatchewan, Saskatoon. Other wheats called double-crosses, which are very complex hybrids originated at Minnesota, were also

Harvesting rust-resistant strains of wheat. Note the manner of planting employed to secure and maintain the strains in purity. This method was selected from many as being the most satisfactory.

factors in the experimental work, as was a wheat named Ceres. This last was originated at the North Dakota station at Fargo by Waldron. It possessed a certain amount of rust resistance sufficient to reduce losses in light attacks, but not enough for heavy epidemics.

Originally a twelve year breeding programme was considered necessary to complete the undertaking. Actually, time being a big factor, this period was reduced from two to three years. The first year, 1925, the crosses were made with the breeding stock selected, using common bread wheats such as Marquis, Reward, Ceres, and others as one of the parents. The second year the first generation plants from these crosses, some 100 in number, were available. These, sowed the third year, yielded what plant breeders call the "F2", or segregating generation, where one sees all the characteristics separating out and re-combining, and in which some 10,000 plants were involved. During the fourth year selection and growing of the progenies of 1,000 plants, or lines, selected from the previous years' 10,000, was carried out. In the fifth and sixth years selection and growing of progenies was continued, with attention paid particularly to reduction of the number of lines, to keep the breeding material within bounds. The seventh, eight, and ninth years were to provide a check for yield, and milling and baking qualities, while the remaining three years will be necessary for increasing the amount, for making commercial quality tests, and for distribution to farmers. Possibility of cutting down this time was afforded by growing the progenies in the greenhouse under powerful electric lights during the winter season. Also by combining years five and six another year was gained. If commercial testing is carried out for two years only, a third year will be saved.

Testing of these wheats for rust resistance proved an example of genuine co-operative effort. The first year a small plot test was run at the station where the breeding was done. The second and third years provided enough seed for milling and baking tests of a prelimi-

—Dominion Department of Agriculture photograph

Illustrating the effect of stem rust on wheat. Contrast the unrusted wheat on the left with the badly rusted plot on the right—clean, upright straw with full heads versus weak-strawed, poorly-filled heads.

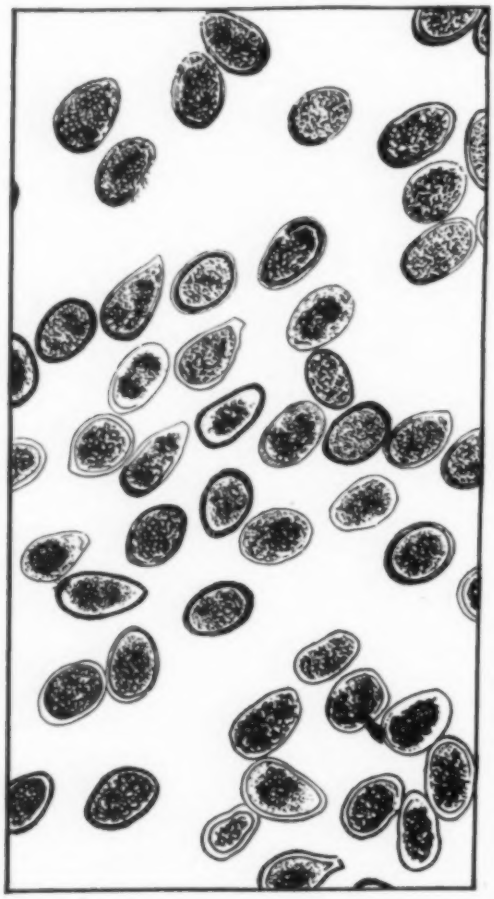
minary nature. Then followed the co-operative growing tests. These involved 13 stations in Western Canada at which four plots of each variety were grown at each place. Winnipeg, Morden, Killarney, Brandon, Birtle and Swan River in Manitoba; Indian Head, Swift Current, Scott, and Saskatoon in Saskatchewan; and Lacombe, Edmonton, and Fallis in Alberta were selected. The points were concentrated in Manitoba due to the prevalence of rust there, but were fairly representative crop districts on the Prairies. In this way also the general suitability of the varieties was determined.

A tremendous amount of work was necessary in carrying out these growing tests, as may readily be surmised. All the plots were sown by hand, the amount of seed being small and precious. Several times during the growing season each plot had to be checked for a study of the agronomic characters of the wheat — height, type of straw, etc. Then each plot was harvested separately by hand to avoid mixing; each was threshed separately by hand; weighed for yield separately; sent in to the central laboratory wrapped separately; and the data there tabulated and summarized. Approximately 5,000 test plots will be required to perform the agronomic tests on the 33 strains under test this year. The figure for the same tests in 1932 was 5,328. Probably 3,000 test loaves of bread will be baked and examined. In 1928 some 750,000 individual plants were concerned. Altogether the organization required for this programme was extensive to a degree in order to avoid confusion and possible errors.

Milling and baking tests were co-operative work largely and were done in conjuction with the plant breeding programmes. After the end of the third year, and following the start of the co-operative growing tests, they were made in a comprehensive manner. Wheats under scrutiny were tested for grade, weight per bushel, crude protein content, ash content, yield of flour, wet and dry flour colour unbleached, and wet

Harvesting wheat in typical fashion on the Western prairies.

A common sight between Winnipeg and the Rockies in August and September. The test as to whether rust has cut down the yields is really determined here.



Red rust spores, the spores which do the damage to western wheat crops, greatly magnified. This type have been trapped 5,000 feet in the air on microscopic slides by the Royal Canadian Air Force planes indicating their wind-borne capacity.

and dry flour colour bleached among other tests. In baking, loaf volume, crust character, crumb colour, texture and absorption were checked. Baking tests were done at Ottawa, in the laboratory of the Dominion Cerealist, on each wheat from each place by three different methods of baking—the basic, bromate, and blend methods. At the University of Manitoba, the University of Saskatchewan, and the University of Alberta, all of which co-operated, the baking chemists took composite samples of each variety grown in each province. Each sample was tested for protein content, carotin content, gas production, diastatic activity, and each was baked by several methods.

Developing laboratory technique to a satisfactory standard at all the laboratories employed on the problem was a difficult matter to accomplish. Moreover the technique employed early in the work was far from satisfactory and, new methods had to be evolved. For example the crumb colour, which is dependent on the carotin content, or yellow pigment, of the wheat, used to be a matter of judgment. These laboratories have worked out a method of determining quantitatively the amount of carotin in the flour and are therefore able to foretell what the colour of the bread will be before it is baked. Altogether the milling and baking tests are considered as most satisfactory and thoroughly dependable.

After completion of the milling and baking tests, in the later years especially, the plant breeders committee met with the baking chemists to discuss results and to decide upon the varieties which were to be eliminated or advanced for further tests. During the last two years this work has been carried out co-operatively. As indicated these tests are not final. A large scale test in a commercial mill is yet to be made of the wheats now announced, before the breeders and chemists will consider them ready for distribution to farmers.

The plant pathologists' share in the development of these wheats must not be minimized. Before the plant breeding programme commenced in earnest in 1925 considerable data concerning rust and epidemics had been accumulated. The groundwork on which to build had been well and carefully laid, not only in rust investigation but also in regard to other major plant diseases common to the wheat-growing areas of Western Canada, and which must be considered when wheats suitable to such a wide territory are being selected.

By 1925 it had been thoroughly established that rust spores which caused the epidemic in Western Canada were not native to the territory affected in sufficient numbers to cause such terrific outbreaks, but were wind borne from the wheat fields and country away to the south across the International Boundary. Had not slides been exposed during favorable south winds and spores trapped on them? Had not aeroplanes

exposing slides trapped spores 5,000 eet in the air 200 miles north of the wheat growing sections of Manitoba? Moreover some 400 square miles of likely Manitoba soil has been searched for bushes of the common barberry, the host to rust spores, and none found outside of a few domestic windbreaks. A definite check was maintained on "spore showers" blowing in from the south so that the presence of spores and the intensity of their numbers was fairly well known, the prospects of an epidemic being dependent on the number of spores and on how favourable the weather proved to be.

In addition pathologists were engaged in making a collection and survey of rust forms to be found in Western Canada, knowledge which was most essential when it came to testing out prospective rust-resistant strains coming forward from the plant breeders. The co-operation of the plant pathologists with the plant breeders was most essential, therefore, in the disease-resistant stage, or phase, of the breeding programme. Each and every wheat advanced for further tests must have passed the resistance test given by the pathologists. Artificial epidemics of rust and other diseases such as black chaff, foot rot, and loose and covered smut were produced for the plant breeders so that all the selected varieties could be tested for all the important cereal diseases. Tremendous detail work and constant vigilance in both greenhouse and field was entailed in this undertaking. Work of this nature was done at the Dominion Rust Laboratory at Winnipeg, at the Dominion Department of Agriculture laboratories at Saskatoon and Edmonton, and at the Universities of Manitoba, Saskatchewan and Alberta.

Much fundamental work essential to the knowledge o how to control these diseases was also done. Delving into the nature and life history of these organisms was, and still is, an integral part of the work of the pathologists. As an example of one such piece of work Dr. J. H. Craigie, working at the Winnipeg laboratory, made the startling discovery, of the existence of sexuality in rust spores. This discovery indicated the possibility of natural crossing in rust spores, with the consequent possiblity of untold numbers of strains of rust being produced, which might in turn affect wheat varieties in an unexpected degree and manner. The fact that this had doubtless been going on in nature for an untold number of years removed the "dangerous" element from the discovery, but as a piece of fundamental research the work is in a class by itself. Another discovery, incidental to the work, was the fact that "black" rust spores or teliospores, formed at the end of the growing season in the fall, continually refused to germinate without their regular resting period. It was found that by humouring these spores and submitting them to favourable temperatures they could be made to

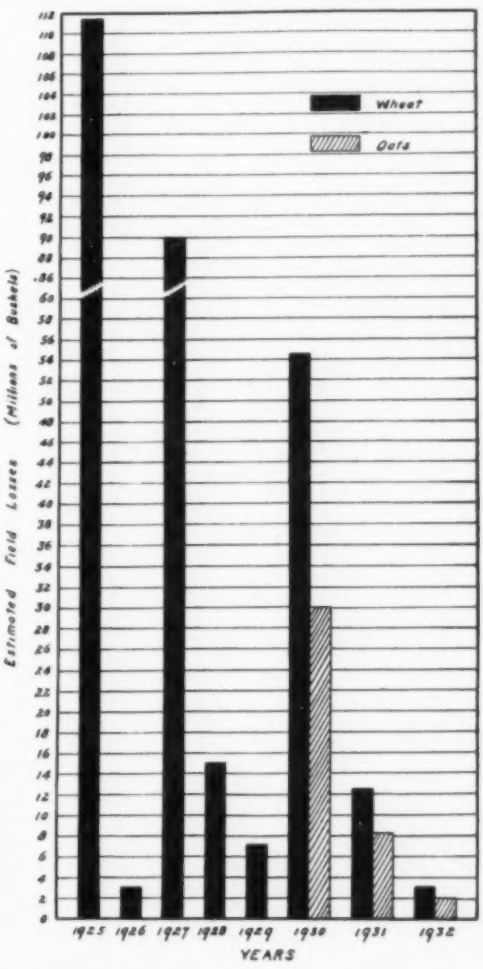


Chart showing the losses in bushels per year since 1925 for wheat, and since 1930 for oats, due to stem rust, in Manitoba and Saskatchewan.

Rust Research Laboratory at Winnipeg, headquarters for research work on cereal crop diseases in Western Canada, and located on the grounds of Manitoba Agricultural College. Note the greenhouses showing in the rear of the building.

germinate almost at will. Such analytical work is being done in investigations into the nature of most of the common diseases of cereals.

Thus through the co-operation of the plant breeders, plant pathologists, milling and baking chemists and those who made the growing tests, the problem of rust-resistant wheats has been solved. It is a triumph of the first order. From the thousands of hybrid plants derived from the original crosses all but 33 have been found wanting and are now discarded, while six of these 33 are now deemed suitable for distribution to farmers.

As the attack on rusts has gathered momentum, the attack on other diseases of field crops has been widened. There remain many diseases other than rust, such as foot rots and smuts, to which equal attention must be paid. With rust-resistant wheats assured, greater energy can now be applied to preventing the losses incurred from other sources.

A bold young sentinel. Crested auklet on Little Diomede Island.

LITTLE DIOMEDE

An Arctic "Bonaventure Island"

By EILEEN JENNESS

INCREDIBLE as it may sound, on a clear day one can stand on the northwesternmost point of America, in the little village of Wales, and glimpse on the far horizon the grey outline of East Cape, on the continent of Asia. Eskimos of Alaska and Chuckchees from northern Russia cross the intervening stretch of water in small, roughly built skin boats, little conscious of the fact that they are the only people in the world who cross from the Old World to the New in boats that lack every modern device of navigation. And though this route is now comparatively little used, in olden days, centuries before Columbus had planned his journey to this side of the globe, it was a busy thoroughfare for man and woolly mammoth alike, between the Eastern and Western hemisphere.

Lying almost midway between the two continents, the Diomede Islands (part of the territory of Alaska) form natural stepping stones that break a passage otherwise as rough as the English Channel. Big Diomede is but twenty-one miles from Asia, Little Diomede but twenty-two from America, and a bare four miles separates the two. Bleak and bare masses of granitic rock, the islands rise straight up from the sea to a height of over one thousand feet. The sole landing place on Little Diomede is a narrow beach of water-worn boulders, where the mountain slopes down a

Note how Little Diomede lies between the northwesternmost part of America and the most easterly point of Asia.

Eskimo village on Little Diomede Island, with the modern school house of the U. S. government. The island is two miles long, one mile wide, and 1300 feet high. This is the only possible landing place on the island and the only possible site for habitation.

little more gently towards the sea. In stormy weather it is quite impossible to land even on this one small haven of the island. United States schooners are supposed to call in two or three times a year, but the traffic is so irregular that, though one may easily land on the island at some time during the summer, it is a question of sheer luck whether one will get off again before ten or twelve months have elapsed.

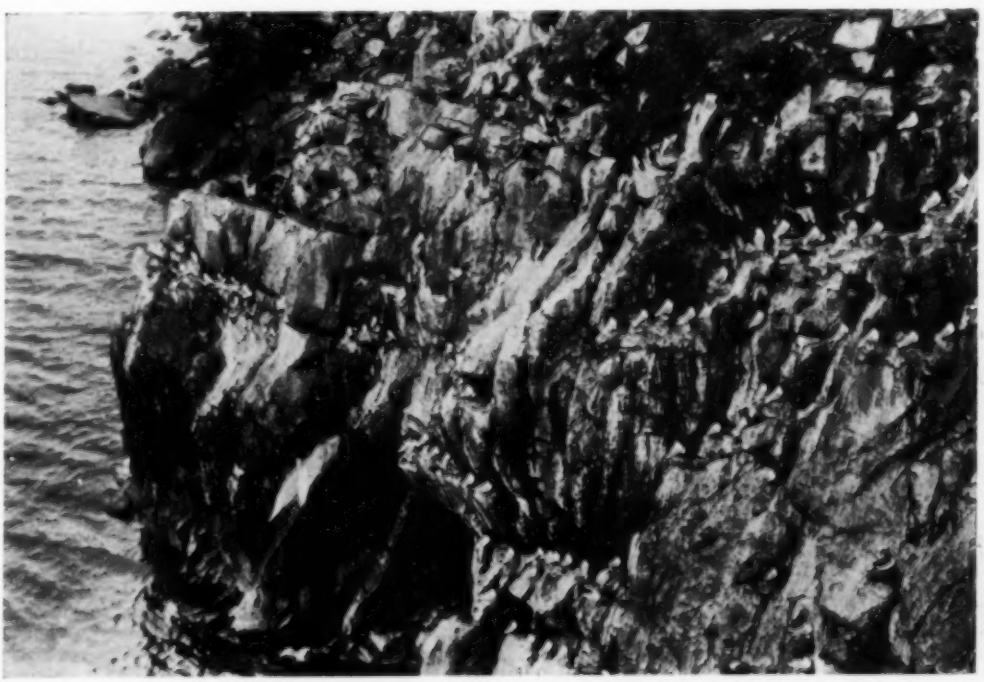
In spite of its enforced isolation, a native village lies on the slope of Little Diomede, and an enthusiastic missionary and school-teacher spend their days here in an effort to improve the standard of living of the few Eskimos who make this bleak coast their home. The village is only a motley collection of stone huts thrown up on either side of a narrow pathway; and above the village in the breccia of the hillside lies the graveyard, almost more populous than the village itself. There is a tradition that the ancient village is now buried beneath the water, and the belief may quite well be true, for certainly the water between the island and Big Diomede is very shallow, and the

Chuckchees from Siberia crossing over to Wales, Alaska, in an open skin boat. They take two days for the voyage, spending a night on Little Diomede Island.

coastline itself seems new, with little or no signs of erosion on it.

Though the island is bleak and barren with no possibility of cultivation of any kind, there are yet many kinds of wild flowering plants and mosses; and countless species of lichens grow to a thick crust in every crevice of the rocks. But it is the birds that make the island a veritable paradise for the nature lover; they have earned for this gloomy, inhospitable spot the name of 'the Bonaventure Island of the Arctic'. Thousands of sea-birds, auklets, kittiwakes, murres, and puffins, make it their nesting place during the brief summer months, and at all times of the day and night, come swooping and circling about the island, their penetrating raucous cries driving out every sound of the wild surf that pounds continually on the rocky shore. The auklets hide their nests under the boulders on the hillsides, but an equal host of kittiwakes and puffins deposit their eggs on the ledges of inaccessible cliffs overlooking the water. The local Eskimos prize the puffins especially for their fat stubby bills, jingles with which they ornament the sleeves and

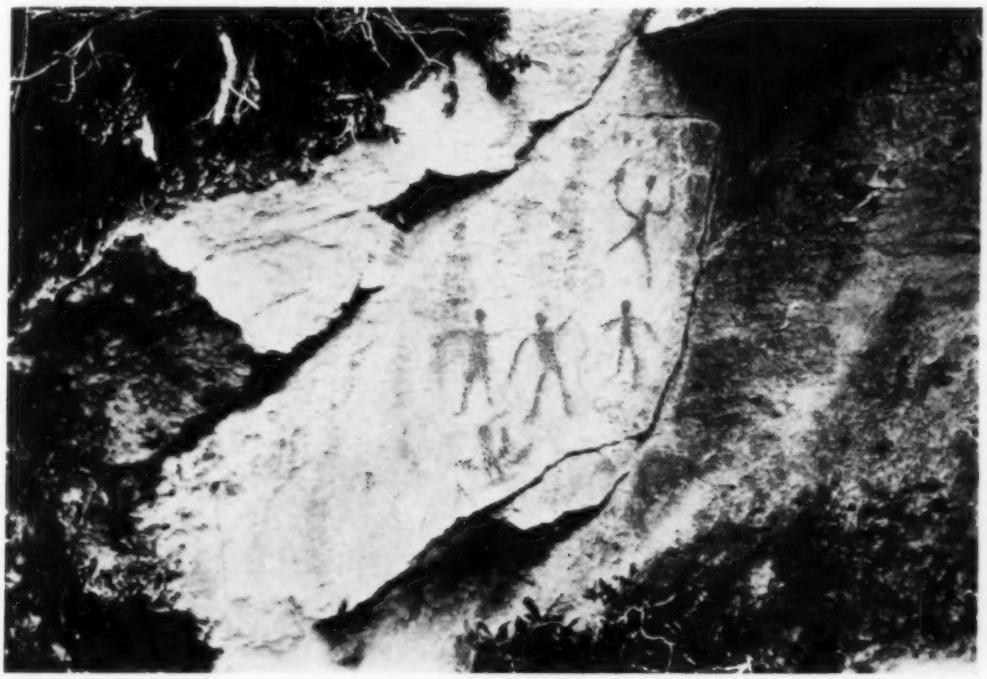
Catching auklets with a hand net, using live birds, already captured, as decoys. Auklets breed in myriads on the Diomede Islands as in Northwest Greenland, where the Eskimos capture them in a simliar way.



Kittiwakes and newly hatched young on the cliff ledges of Little Diomede Island.

Eskimo school-teacher and his wife and family. He has taken his training at the United States training school for Eskimos, and returned to Diomede Island to take charge of the school-house there. These Western Eskimos learn very quickly, and are adapting themselves readily to the new ways of the white man. In the background is the frame of a skin boat, set up on racks made of whale bones.

Stone house on Little Diomede Island, with door frames of whale ribs. Outside of Greenland, the King Islands and Little Diomede are the only places where the Eskimos still live in stone houses, though ruins of these dwellings are scattered in many places throughout the Arctic.



Rock painting on the Tuksuk River, Alaska, said to commemorate a battle with Siberian natives. This is the only rock painting yet recorded in Eskimo territory.

Woman of Wales, Alaska, being tossed on a walrus hide, a pastime indulged in by old and young Eskimos alike. Formerly this was a ceremonial game to celebrate a successful walrus or whale hunt. The success or failure of the tossed Eskimo to land on his feet is what lends excitement to the game.

lower edges of their coats; the more up-to-date Indians of our West Coast use tin-thimbles for the same purpose in decorating their dancing regalia.

Three species of auklets nest on Little Diomede and on the adjacent Big Diomede, the 'crested', the 'least', and the 'parroquet'. The parroquets are less numerous than the other two, and more timid; they do not frequent the vicinity of the village, where the other birds, oblivious of human habitations, raise a clatter that can be heard above a gale. All three species nest, not on the cliffs, but in deep, narrow crannies, among the myriad rounded boulders that cover the hillsides. It is an eerie sound as you clamber over the rocks to hear below the surface their shrill continuous chatter and frightened squawks. And though their nests are so numerous that you are literally walking over one at every step, seldom are you able to catch a glimpse of the mother bird sitting on ther single egg. For some superstitious reason the natives will not shoot the auklets as they do the other birds; instead they catch them in long peculiar hand-nets, with which they dextrously 'fish' for them far up in the air. To decoy the birds to their blinds, built among the ragged boulders, they tie a live bird to a line nearby; the fluttering captive, tied by its beak, soon attracts its comrades, and the Eskimo, suddenly sweeping up with his net, almost invariably bags one or more to add to his line of flutterers. Early morning is the proper time for netting, when the flocks are streaming back and forth along the hillsides, seemingly mustering for their daily tasks. From about 10 a.m. till evening they fluctuate between sea and land, seeking the shrimps that lurk among the sea-weed. It is amusing to watch a group, crested, least, and parroquet together, gather on a boulder near shore, chatter and squabble for a few minutes, then at a long shrill note like a protracted "come", rise in a cluster, joined by all the surrounding groups, and swoop out over the water. The rocks that just before were alive and seething become bare and still. But only for a minute. Almost before you have reset your camera for a second picture another flock gathers on the same boulders, lingers awhile to exchange greetings, and in its turn flies away.

The rugged sweep of the Antrim coast line as seen from Island Magee.

The Coast of Antrim

By W. H. Curtis Galt

AROUND the north-eastern coast of Ireland, with the sounding sea on one side and steep basalt cliffs on the other, runs a highway remarkable both as a fine piece of engineering and because of its historic and picturesque associations. Tales of war and peace, of fierce feuds and minstrel wanderings, of the good Saint Patrick who spent his youth tending flocks on the mountain slopes of Antrim, of the ill-fated ships of the Spanish Armada that crashed at the foot of these frowning crags, cling to this region of the Antrim Marine Drive. Here and there the wall of rock is broken, and the traveller has unforgettable glimpses up one or other of the exquisite Glens of Antrim, with mountain summits in a purple haze. Out beyond the blue sea, if the day is clear, you will see the coast of Scotland, and perhaps the mountains of Arran rising beyond the Mull of Kintyre, or Cantyre, as it is shown on the accompanying map.

H. V. Morton drives over this highway in his *In Search of Ireland*, and says that he knows of no other eighty miles of road anywhere in the British Isles that can show more varied or entrancing beauty. "There are hills that rise to the height of mountains, low lands and high lands, glens and waterfalls, with slow rivers slipping through them, fairy-like woodlands, broad pasture lands, sudden stretches of brown Irish bog and, always, either in sight or within hearing, the sea thundering on rocks or sweeping in long waves over yellow sands."

Let us follow the windings of the Antrim Marine Drive from its northern terminus at Portstewart down to Belfast.

For the sake of its contemporaneous origin with Saint Patrick, we might start from Coleraine, in the adjacent county of Londonderry. By so doing opportunity is afforded of noting the striking contrast between the bleak aspect of County Londonderry and the bright atmosphere of Antrim. As one approaches Portstewart it seems like a sudden transition from the dismal to a land of sunshine and flowers. Portstewart is, perhaps, one of the cleanest and most picturesque towns in the province of Ulster. The town is built up from the sea on terraces, one above the other, and facing two bays, one of which looks northward towards the mountains of Donegal and the other towards the coast of Scotland. At one end of its spacious promenades, an impressive castle overlooks the town.

Beyond Portstewart, the road stretches above the cliffs for three miles and just skirts Portrush, which stands

The Parish Church of the town of Coleraine, County Londonderry.

on a promontory to the left. Some rivalry exists between these two watering places, which are almost twin towns, although Portrush claims to be the more fashionable of the two.

Three miles further on are seen the ruins of Dunluce Castle, built on top of a rock and cut off from the mainland by a huge moat. The castle is well worth a visit on account of its isolated and strongly fortified position. It belongs to the family of the Earls of Antrim and in former years was their principal residence. The story of Dunluce Castle is a grim one of siege, warfare and disaster. Happily, the present residence of the family at Glenarm, forty miles further along the shores of Antrim, has a story of a different character and is a very beautiful mansion. It is interesting to note that the first electric tramway ever built passes the old ruins of Dunluce.

Close to here we pass the Giant's Causeway, a standing wonder of the world. As is well known, this is an unique formation of rock cropping out in the form of close-set, vertical columns of irregular polygon shape in cross section. There are some 400,000 such columns in the formation.

In the neighborhood of Ballintoy, a fishing village close by, is a locally noted rope bridge hanging over a chasm sixty feet wide and of greater depth. A couple of planks are lashed across and fastened at either end of the basalt rocks. To cross it is a good test for the nerves.

With our arrival at Ballycastle, a pleasant watering resort, we also come to the commencement of the Glen district. Behind Ballycastle rises the sombre mass of Knocklayd Mountain. The valleys of Glenesk and Glentow separate Knocklayd from the southern part of the County of Antrim. Untouched by the plow, bracken and fern cover the slopes of those glens in profusion and as the sun warms up the sheltered hollows, the visitor enjoys to the full the soft beauty of the Antrim Glens. As a contrast, out in the bay are seen the towering cliffs of Rathlin Island, of which Ptolemy wrote eighteen hundred years ago.

Where river meets sea at the village of Cushendall.

Garron Point at Carnlough, and the historic Garron Tower.

Carrick-a-rede bridge, near Port Ballintrae, a swaying, rope foot-bridge, popular with holiday visitors as a mild test for nerves.

Port Braddon, near the Giant's Causeway, the commencement of which is seen at the right.

Fairhead, one of the largest promontories of the north, rises to over six hundred feet. From the summit of the cliffs there is a perpendicular fall of some three hundred feet. The base, sloping out to the sea, is covered with broken columns which offer interesting studies to the geologist.

Peculiar features of these Antrim headlands are narrow but almost bottomless cracks in the rock. The fissures are only from twelve to fifteen inches in width but they have such an uncanny effect that many people find it difficult to step across them, even though they may have been unaware of their existence. When stones are dropped down the cracks, weird echoes are produced.

An unfinished road extends from Ballycastle to the twin towns of Cushendun and Cushendall. Nature is to be found in her wildest along these steep crags facing the Irish sea, but as the route is not suitable for motoring, we must leave the coast line for a few miles and take the inland road.

Turning a curve about a thousand feet above the valley of Glendun, the scenery changes completely. Stretching along the two sides of the valley, the motorist sees a complete horseshoe bend with a lofty viaduct above the River Dun. The road descends for three miles inland to where the viaduct forms an inside of the shoe; then following the river towards the sea, it turns southwards to the town of Cushendall. With the next few miles are found the valleys of Ballymon, Glenaap, Glencrop. Cushendall, a charming and sheltered town, lies at the foot of Lurigethan Mountain and in the vicinity are three other mountains which contribute to the glen formations.

In the centre of the town stands an old limestone tower, build in the year 1790 as an imaginary protection against Napoleon and the French. The builder and commander of this fort issued many eccentric instructions to the soldiers under his command, as to their actions in the face of danger, but these orders were never put into execution, for

The Curfew Tower at Cushendall, a reminder of the days when a Napoleonic landing in Ireland was feared.

Glenarm Castle, the present home of the Antrim family.

Red Bay, on the Antrim Marine Drive, which closely follows the coast line.

Photograph by R. V. Welch

A glimpse of the valley of Cushendall, with Lurigethan Mountain in the background.

Napoleon failed to attack either this greatly concerned officer or his limestone tower.

The Antrim Coast Drive rejoins the sea at Waterfoot, a few miles beyond Cushendall. Waterfoot is, to some extent, an important place for it lies at the foot of the valley of Glenariff, which opens up wide to the sea at this point.

Beyond this point, the coast drive skirts the foot of Garron Mountain. Should the motorist be unacquainted with the district, he will miss a feature of interest, Garron Tower, five hundred feet above his head. This castle, built by the Londonderry family, two hundred years ago, has been converted into an up-to-date hotel. Many of the family treasures still remain in this aristocratic mansion.

With the waves always rippling on the left, the Marine Drive continues its serpentine way around immense crags with precipices of dark basalt topped with light coloured limestone, rising to heights of a thousand feet and more.

Ahead of us rises an apparently impassable mountain, rising steeply for many hundreds of feet out of the sea, with the waves lashing furiously at its steep sides, even in the calmest weather. Blackcave Tunnel, however, opens up a roadway for us, cut through the heart of the rock.

Approaching Larne, contours and landscapes show rapid changes. A ferry boat connects the town of Larne with Island Magee. In the body of water between the two, called Larne Lough, battleships and steamers are to be seen riding at anchor.

We are now approaching the entrance to Belfast Lough and hazy glimpses of the city of Belfast are seen in the distance. One of the most conspicuous features here is the ancient town of Carrickfergus with its equally hoary castle, dominating Belfast Lough. Both King John and William the Third visited this historic town. At or near high tide the waters of the Irish Sea fill Belfast Lough, giving the traveller a pleasant impression of the Lough and the suburbs of Belfast as he leaves behind him one of the finest and most picturesque roads built in recent years.

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Editor's Note Book

Our Contributors

Colonel William Wood, who uses the occasion of the centenary of the sailing of the *Royal William* to tell the authentic story of that historic Canadian vessel, is an authority on all matters relating to shipping. He is, among other books, the author of "Logs of the Conquest of Canada", "All Afloat", "Elizabethan Sea-Dogs", "Flag and Fleet."

Mr R. M. Scott, Assistant Agricultural Editor of the *Winnipeg Free Press*, writes as the mouthpiece of the group of Canadian experts who have given several years of their lives to studying the causes and conditions of Wheat Rust in the Prairie Provinces, and have now solved that exceedingly difficult problem. In doing so, they have saved the Dominion and its farmers countless millions of dollars.

Mrs Diamond Jenness, who describes entertainingly one of the westernmost outposts of North America in her article in this number on "Little Diomede Island", is the wife of Diamond Jenness, of the archaeological section of the National Museum of Canada, and is herself no mean traveller.

Capt. W. H. Curtis Galt, late of the 4th Battalion, Royal Irish Rifles, is a native of the north of Ireland of which he writes. He is at present resident in Montreal, where he frequently lectures on his wanderings throughout the United Kingdom. He has also given special lectures at McGill University on the Wa-swahili tribes of Central Africa, where he served in the Great War.

Capt. W. H. Curtis Galt

Cook and Bougainville

Maurice Thiéry has recently drawn attention to the curious circumstance that in 1749, when Wolfe and Montcalm were struggling for the possession of Quebec, and the mastery of a continent, each had in his forces a young man who was afterwards to become famous as an explorer of remote seas. Louis Antoine de Bougainville was an officer of the garrison, and James Cook was a boatswain on one of Admiral Saunders' ships, and incidentally did invaluable service to the fleet by charting the river.

Such is "Mal de Mer"

Thiéry, by the way, tells an amusing story of the learned French naturalist Commerson, who accompanied Bougainville on his voyage around the world. Commerson was filled with enthusiasm for the flora and fauna of land and sea, so much of it new to him, until the ship sailed into the Straits of Magellan and was buffeted almost continuously by contrary winds. Commerson was not a good sailor, and we are told that after a time "he would gladly have exchanged all the wonderful birds that ranged the ocean for the chirrup of a single tiny French sparrow, and would willingly have let all the whales of the Atlantic perish if only he might be allowed to sit and watch a cow grazing in a peaceful Normandy meadow."

Mountain Sickness

Mr. Polovtsoff, in his "Land of Timur," has some interesting remarks on mountain sickness and its causes. Most of us had supposed that the distressing ailment was simply the result of high altitude and rarity of the air, but it appears that the problem is not so simple. Mr. Polovtsoff was told by the natives in the Pamirs that certain

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places caused 'toothek', as they call it, while others at a higher elevation did not, and found by experience that they were right. He spent one wretched night at a post-house, at a lower elevation than many others where he had suffered no particular discomfort. Here, however, he spent the night gasping for breath and believing that he would not live till morning. The local theory was that 'toothek' was caused by gas escaping from cracks in the rock.

Curiously enough a traveller in South America confirms this theory. In Peru mountain sickness is known as 'soroche'. It "attacks, stupefies, and leaves its victims wishing they were dead." These symptoms are the result of the sudden decrease in the supply of oxygen at high altitudes. But he adds "There is something else involved in it, something mysterious emanating from this volcanic, highly charged soil, because some of the ranges induce the soroche and others do not."

Odd Birds

One is so accustomed to think of that singular bird the Dodo as apocryphal, and to identify it with Tenniel's picture of the Caucus in "Alice in Wonderland," when the Dodo presented Alice with "this handsome thimble," that it comes with something of a shock to read in a serious book of travel that "Mauritius in common with its neighbouring islands, was the home of that humorous and now extinct bird the dodo." As a thing of beauty it probably ranked with "that weird, goggle-eyed little creature the Aye-aye," a native of Madagascar, which is said to possess the largest eyes for its size of any animal known. The Aye-aye, however, is not a bird, in the biological sense. Neither, to tell the truth, is that singular inhabitant of Australia the Platypus, queerest of all the queer inhabitants of that immense island. The Platypus seems never to have quite decided if it was a bird, a fish or a mammal, and so exercises some of the characteristics of all three. At any rate, the Great Auk unquestionably was a bird, although it could not fly, and has been extinct since 1844. From what we know of it, it would appear to have been one of the least handsome members of its numerous family. Its home was in Spitzbergen, and by a natural association of ideas one is

reminded of that other huge, ungainly flightless bird, the Emperor Penguin, which appears to thrive and achieve its own peculiar brand of happiness in a temperature of anything down to 60° to 70° below zero, at the other end of the world.

Arctic Expedition 1933

The "Nascopie" with the Canadian Government Arctic Expedition, sailed from Montreal for the far north on July 8. The voyage will cover about 12,000 miles, and the "Nascopie" is not expected back in Montreal much before the beginning of October. This will be one of the most ambitious northern patrols yet attempted. Besides visiting posts on Baffin and Ellesmere Islands, the vessel will sail into Hudson and James Bays. The scientific work, in charge of officers detailed from the Departments of the Interior, Mines and Marine and from Macdonald College, will include surveys of native and wild life, plant life, mineral occurrences, and parasites. A Medical Officer and a detail of Mounted Police go up with the expedition, to relieve others who have been on duty in the Arctic for the last two years.

Riding Mountain National Park

This latest addition to Canada's national playgrounds was officially opened on July 26. The Park is in Manitoba, has an area of 1148 square miles, and contains a notable combination of natural attractions — particularly to those who do not know Manitoba and think of it as flat prairie. Here there are hill, lake and forest, and the wild life includes elk, buffalo, moose, deer, black bear and beaver. The herd of elk, between 2000 and 3000, is probably the largest in Canada. The improvements embrace good roads and trails, camp sites and equipment, a community ice-house, spring-fed wells for drinking water, motor service stations, a golf course and tennis courts, facilities for boating and fishing, a small summer hotel and a bungalow camp.

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The Way of the World

A traveller in Buenos Aires, describing some of the monumental public buildings, says of one of the banks: "It was triangular and had a huge carved entrance like one of the church portals in Lima. The rest of its triangular bulk was smooth and naked like a bird that has been plucked bare except for a bunch of tail feathers left in the prominent position." And he makes this general comment, "The banks were only indulging in the usual competition of impressing a public, obviously trained to infer their capital resources from the monumental character of their premises." All of which seems to have a certain application to the headquarters of Canadian banks in Montreal and Toronto.

Kamanistikwia

This is one of about fifteen variants of the mouth-filling Indian name of the small stream that flows into Thunder Bay of Lake Superior through the towns of Fort William and Port Arthur. The name is said to mean 'three rivers', because of the three mouths of the Kam, as the river is known locally to-day. Like a number of other places in Western Canada — or perhaps one should say Central Canada — the history of the Kaministikwia goes back quite a long way, as time counts on this continent. DuLhut, the French explorer, after whom the city of Duluth was named, is believed to have built a small trading post at the mouth of the Kaministikwia in 1678; and Radisson probably paddled along these shores sixteen years earlier. Zacharie Robutel de La Noue built a fort there in 1717, and La Vérendrye wintered there in 1731 while making preparations for his expedition in search of the Western Sea. The Kaministikwia was probably the first portage route to Rainy Lake. La Vérendrye opened the Grand Portage route; and at the end of the eighteenth century the Kaministikwia route was re-discovered by men of the North West Company. Fort William, built by the North West Company about 1801, was for many years the western headquarters of that Company. On its site was built the modern city.

Rival Towns

Mention of Fort William recalls the long and sometimes bitter rivalry between that town and its neighbour Port Arthur, one place associated with the Canadian Pacific Railway and the other with the Canadian National and its predecessor the Canadian Northern, and both tremendously preoccupied with the problem of storing grain in terminal elevators and shipping it east on lake vessels. For many years they were twin towns in size, population and enterprise, but of late years Fort William has been running away from its rival. Nevertheless one is bound to say that, while Fort William is the larger and perhaps more energetic place, Port Arthur is where one would prefer to build a home. It seems probable that within a comparatively short time the two towns will inevitably grow into one, as the space between them is rapidly diminishing. The same circumstances apply, or have applied, to the Middle American cities of Minneapolis and St Paul; and also to the far western towns of Seattle and Tacoma. And many years ago we had a triangular rivalry between Montreal, Quebec and Toronto, but in their case the bone of contention was not so much which should become greatest in size or commerce, but rather which should be selected as the national capital. In the end, as we all remember, Queen Victoria wisely decided not to recognize any of the rivals, but chose as the political centre of the new Dominion the modest but picturesque little town of Ottawa.

Amongst the New Books

Islands Far and Near. By Robert H. Davis. New York: D. Appleton & Co. 1933. $3.

Bob Davis, of the New York *Sun*, has spent a good part of his life knocking about the world, and putting his experiences of men and places between the covers of very readable books. There is nothing very profound about Mr Davis' observations, but it is none the less good stuff, shrewd, alive, and full of humour. We travel with him to Honolulu, Victoria, Bimini, Martinique, and some of the islands off the Virginia coast, and we meet many people of many kinds, from a Hawaiian policeman to a travelling Dean of Canterbury.

* * *

Northumberland and Durham. By Iris Wedgwood. London: Faber and Faber. 1932.

Lady Wedgwood writes with sympathy and understanding of the coast and valleys and rivers of these northern counties of England, of their towns and castles, of the Roman Wall, of the old days of romance and the new days of industry. We visit the Tweed and the Till, Flodden, Alnwick and Morpeth, Bamburgh and the Holy Isle, Derwent and Jarrow, Durham and its castle, Caldron Snout, Staindrop and Castle Eden, and our reading of these and other places is made more attractive by the wealth of illustrations including sixty drawings by G. E. Chambers.

* * *

A Wayfarer on the Rivieras. By E. I. Robson. London: Methuen & Co. 1932. 7/6.

Mr Robson dealt briefly with the Riviera in an earlier volume in this series, *A Wayfarer in Provence*, but here is able to concentrate on the geography, history, art, life and manners, legends and stories, of this fascinating Mediterranean shore. We wander with him along the French Riviera, from Fos to Napoule, from Cannes to Menton, and along the Italian Riviera, from Ventimiglia to Laiguelia, Alassio to Genova and Livorno. J. R. E. Howard contributes 12 drawings, which will bring back remembered scenes to some readers

* * *

The Problem of the North-West Frontier. By C. Collin Davies. Toronto: The Macmillian Company of Canada. 1932 $3.75.

Few questions are of more intense interest to the student of India and its future than that of the North-West Frontier. Through that vulnerable quarter of the great peninsula have poured from age to age the conquering armies of other and more warlike races, and what has happened in the past is extremely likely to happen again, should the British army be withdrawn from India and that much-troubled land left to defend itself. Mr Davies discusses Frontier policy as an Imperial and also as a local problem, how that policy has varied from time to time under different British administrations, the relations between India and Afghanistan, tribal distribution and characteristics along the frontier, and offers some significant conclusions.

* * *

Tristan da Cunha. By Douglas M. Gane. Toronto: Thomas Nelson & Sons. 1932. $2.50.

This lonely island of the South Atlantic — a visit to which was described in the December, 1930, number of the *Canadian Geographical Journal* — lies about midway between South Africa and South America, and 1320 miles south of St Helena. The purpose of the present book is to bring together a number of accounts of the island and its handful of inhabitants, and to urge first that this tiny but not altogether unimportant British possession should not be abandoned, and second that better provision should be made for its loyal inhabitants and their communication with the outside world.

Atlas of the Historical Geography of the United States. By Charles O. Paullin. Edited by John K. Wright. Published jointly by the Carnegie Institution of Washington and the American Geographical Society of New York. 1932. $15.

Twenty years of research are embodied in this very important contribution to historical geography, and in its preparation has been enlisted the collaboration of such eminent specialists in American history and geography as J. F. Jameson, F. J. Turner, Max Farrard, Isaiah Bowman, O. E. Baker, M. W. Jernegan, J. A. Robertson, R. H. Whitbeck and R. De C. Ward. It is probably the most comprehensive work of its kind that has yet been produced dealing with the historical geography of a single country. From whatever angle one may study the history of the people of the United States it will be found an indispensable aid, whether that angle be political, social, economic, religious, educational or military.

As a background the Atlas begins with the country's natural environment. Then follows a series of reproductions of maps "selected to illustrate the gradual widening of geographical knowledge of North America from 1492 to 1867." To these reproductions are added three maps specially drawn to show the routes of Spanish, French and American explorers west of the Mississippi, 1535-1852. The next section deals with the Indians in war and peace, battles and massacres, missions and reservations, etc. Another division deals with land questions, boundaries and boundary disputes, international and state, and so forth. Population and settlement, cultural and religious development, political parties and movements, economic history in all its phases, these are some of the larger aspects of the subject that have been dealt with here, so far as they may be dealt with in maps, with remarkable clarity and completeness.

Obviously all thinking Canadians are interested in the historical geography of their great neighbour the United States, but even from a purely Canadian point of view it is extraordinary at how many points the history and interests of the two countries overlap. Many of the important discoveries of our early explorers were made in what is now the United States — one needs only recall Champlain's discovery of the lake that bears his name, the expeditions of La Salle, Marquette and Jolliet down the Mississippi, La Vérendrye's exploration in the Missouri country and that of David Thompson on the Columbia. The Indian problem was much the same in both countries, and in many cases we had to deal with divisions of the same tribe. The fur trade overlapped at many points, both the North West Company and the Hudson's Bay Company trading and operating posts in what is now American territory. Our transportation problems have been in many respects the same; we use each other's canals along the boundary, and our railways take short cuts across the neighbour's territory. We have both had to deal with a westward movement of population, Indian missions, education, woman suffrage, labour problems, and a host of other questions light upon which is thrown in this Atlas.

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